ii. which exceeds the reportable quantity levels for pollutants at LAC 33:I. Subchapter E.

10. Signatory Requirements
All applications, reports, or information submitted to the state administrative authority shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation - by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(a) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation; or,

(b) The manager of one or more manufacturing, production, or operating facilities, provided: the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations and initiating and directing other comprehensive measures to ensure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and the authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

NOTE: DEQ does not require specific assignments or delegations of authority to responsible corporate officers identified in Section D.10.a.(1)(a). The agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the state administrative authority to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under Section D.10.a.(1)(b). rather than to specific individuals.

(2) For a partnership or sole proprietorship - by a general partner or the proprietor, respectively; or
(3) For a municipality, state, federal, or other public agency - by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a federal agency includes:

(a) The chief executive officer of the agency, or
(b) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

b. All reports required by permits and other information requested by the state administrative authority shall be signed by a person described in Section D.10.a., or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in Section D.10.a. of these standard conditions;
(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (a duly authorized representative may thus be either a named individual or an individual occupying a named position; and,
(3) The written authorization is submitted to the state administrative authority.

c. Changes to authorization. If an authorization under Section D.10.b. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Section D.10.b. must be submitted to the state administrative authority prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Certification. Any person signing a document under Section D.10. a. or b. above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

11. Availability of Reports

All recorded information (completed permit application forms, fact sheets, draft permits, or any public document) not classified as confidential information under R.S. 30:2030(A) and 30:2074(D) and designated as such in accordance with these regulations (LAC 33:IX.2323 and LAC 33:IX.6503) shall be made available to the public for inspection and copying during normal working hours in accordance with the Public Records Act, R.S. 44:1 et seq.

Claims of confidentiality for the following will be denied:

a. The name and address of any permit applicant or permittee;
b. Permit applications, permits, and effluent data.
c. Information required by LPDES application forms provided by the state administrative authority under LAC 33:IX.2501 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

SECTION E. PENALTIES FOR VIOLATIONS OF PERMIT CONDITION

1. Criminal

a Negligent Violations

The Louisiana Revised Statutes LA. R. S. 30:2076.2 provides that any person who negligently violates any provision of the LPDES, or any order issued by the secretary under the LPDES, or any permit condition or limitation implementing any such provision in a permit issued under the LPDES by the secretary, or any requirement imposed in a pretreatment program approved under the LPDES is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both. If a conviction of a person is for a violation committed after a first conviction of such person, he shall be subject to a fine of not more than $50,000 per day of violation, or imprisonment of not more than two years, or both.

b Knowing Violations

The Louisiana Revised Statutes LA R. S. 30:2076.2 provides that any person who knowingly violates any provision of the LPDES, or any permit condition or limitation implementing any such provisions in a permit issued under the LPDES, or any requirement imposed in a pretreatment program approved under the LPDES is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or imprisonment for not more than 3 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person, he shall be subject to a fine of not more than $100,000 per day of violation, or imprisonment of not more than six years, or both.

c. Knowing Endangerment

The Louisiana Revised Statutes LA. R. S. 30:2076.2 provides that any person who knowingly violates any provision of the LPDES, or any order issued by the secretary under the LPDES, or any permit condition or limitation implementing any of such provisions in a permit issued under the LPDES by the secretary, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both. A person which is an organization shall, upon conviction of violating this Paragraph, be subject to a fine of not more than one million dollars. If a conviction of a person is for a violation committed after a first conviction of such person under this Paragraph, the maximum punishment shall be doubled with respect to both fine and imprisonment.

d. False Statements
The Louisiana Revised Statutes LA. R. S. 30:2076.2 provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the LPDES or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the LPDES, shall, upon conviction, be subject to a fine of not more than $10,000, or imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this Subsection, he shall be subject to a fine of not more than $20,000 per day of violation, or imprisonment of not more than 4 years, or both.

2. Civil Penalties
The Louisiana Revised Statutes LA. R. S. 30:2025 provides that any person found to be in violation of any requirement of this Subtitle may be liable for a civil penalty, to be assessed by the secretary, an assistant secretary, or the court, of not more than the cost to the state of any response action made necessary by such violation which is not voluntarily paid by the violator, and a penalty of not more than $27,500 for each day of violation. However, when any such violation is done intentionally, willfully, or knowingly, or results in a discharge or disposal which causes irreparable or severe damage to the environment or if the substance discharged is one which endangers human life or health, such person may be liable for an additional penalty of not more than one million dollars.

(**PLEASE NOTE**: These penalties are listed in their entirety in Subtitle II of Title 30 of the Louisiana Revised Statutes.)

SECTION F. DEFINITIONS

All definitions contained in Section 502 of the Clean Water Act shall apply to this permit and are incorporated herein by reference. Unless otherwise specified in this permit, additional definitions of words or phrases used in this permit are as follows:

1. "Clean Water Act" (CWA) means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or the Federal Water Pollution Control Act Amendments of 1972) Pub.L.92-500, as amended by Pub.L. 95-217, Pub.L. 95-576, Pub.L. 96-483 and Pub.L. 97-117, 33 U.S.C. 1251 et. seq.).

2. "Accreditation" means the formal recognition by the department of a laboratory's competence wherein specific tests or types of tests can be accurately and successfully performed in compliance with all minimum requirements set forth in the regulations regarding laboratory accreditation.

3. "Administrator" means the Administrator of the U.S. Environmental Protection Agency, or an authorized representative.

4. "Applicable effluent standards and limitations" means all state and Federal effluent standards and limitations to which a discharge is subject under the Clean Water Act, including, but not limited to, effluent limitations, standards or performance, toxic effluent standards and prohibitions, and pretreatment standards.

5. "Applicable water quality standards" means all water quality standards to which a discharge is subject under the Clean Water Act.

6. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

7. "Commercial Laboratory" means any laboratory that performs analyses or tests for third parties for a fee or other compensation, except those commercial laboratories accredited by the Department of Health and Hospitals in accordance with R.S.49:1001 et seq.

8. "Daily Discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the sampling day. Daily discharge determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily discharge determination of concentration shall be arithmetic average (weighted by flow value) of all samples collected during that sampling day.

9. "Daily Maximum" discharge limitation means the highest allowable "daily discharge" during the calendar month.

10. "Director" means the U.S. Environmental Protection Agency Regional Administrator or an authorized representative.

11. "Environmental Protection Agency" means the U.S. Environmental Protection Agency.

12. "Grab sample" means an individual sample collected in less than 15 minutes.

13. "Industrial user" means a nondomestic discharger, as identified in 40 CFR 403, introducing pollutants to a publicly owned treatment works.

14. "LEQA" means the Louisiana Environmental Quality Act.

15. "Louisiana Pollutant Discharge Elimination System (LPDES)" means those portions of the Louisiana Environmental Quality Act and the Louisiana Water Control Law and all regulations promulgated under their authority which are deemed equivalent to the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act in accordance with Section 402 of the Clean Water Act and all applicable federal regulations.

16. "Monthly Average" (also known as Daily Average), other than for fecal coliform bacteria, discharge limitations means the highest allowable average of "daily discharge(s)" over a calendar month, calculated as the sum of all "daily discharge(s)" measured during a calendar month divided by the number of "daily discharge(s)" measured during that month. When the permit establishes monthly average concentration effluent limitations or conditions, and flow is measured as a continuous record, the monthly average concentration means the arithmetic average (weighted by flow) of all "daily discharge(s)" of concentration determined during the calendar month where C = daily discharge concentration, F = daily flow and n = number of daily samples; monthly average discharge =

$$\frac{C_1F_1 + C_2F_2 + \dots + C_nF_n}{F_1 + F_2 + \dots + F_n}$$

The monthly average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar month.

17. "National Pollutant Discharge Elimination System" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the Clean Water Act.

18. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

19. "Sewage sludge" means the solids, residues, and precipitates separated from or created in sewage by the unit processes of a publicly owned treatment works. Sewage as used in this definition means any wastes, including wastes from humans, households, commercial establishments, industries, and storm water runoff, that are discharged to or otherwise enter a publicly owned treatment works.

20. "Treatment works" means any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage and industrial wastes of a liquid nature to implement Section 201 of the Clean Water Act, or necessary to recycle or reuse water at the most economical cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power and other equipment, and their appurtenances, extension, improvement, remodeling, additions, and alterations thereof.

21. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

22. For fecal coliform bacteria, a sample consists of one effluent grab portion collected during a 24-hour period at peak loads.

23. The term "MGD" shall mean million gallons per day.

24. The term "mg/L" shall mean milligrams per liter or parts per million (ppm).

25. The term "µg/L" shall mean micrograms per liter or parts per billion (ppb).

26. "Weekly average", other than for fecal coliform bacteria, is the highest allowable arithmetic mean of the daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The weekly average for fecal coliform bacteria is the geometric mean of the daily discharges over a calendar week.

27. "12-hour composite sample" consists of 12 effluent portions collected no closer together than one hour and composited according to flow. The daily sampling intervals shall include the highest flow periods.

28. "6-hour composite sample" consists of six effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

29. "3-hour composite sample" consists of three effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

30. "24-hour composite sample" consists of a minimum of 12 effluent portions collected at equal time intervals over the 24-hour period and combined proportional to flow or a sample collected at frequent intervals proportional to flow over the 24-hour period.

Calculation of Technology Based Limits for Motiva Enterprises LLC, Convent Refinery

Out 001

Refinery Guidelines, 40 CFR 419, Existing Source Only

TABLE 1

Spreadsheet: refinery.wk4
Developer: Bruce Fielding
Software: Lotus 4 0
Revision date: 09/07/00
Calculation Date: 04/19

DATA INPUT:

(*1)
FACILITY INFORMATION

Permittee:	Motiva Enterprises LLC, Convent Refinery
Permit Number.	LA0006041, AI2719
Appendix:	Appendix A-1 - REVISED
Concentration flow, (MGD):	
Anti-backsliding, GL vs Old, 0=n, 1=y, 2=GL+Old	0
Outfall number:	Out. 001
40 CFR 419 Subpart, (A, B, C, D, or E):	B
Refinery Type:	
(Topping, Cracking, Petrochemical, Lube, or Integrated	Cracking

Fritz Howes (318) 632-4103 Rick Williams (319) 632-4102

(*2)

THROUGHPUT RATES	K bbl/day
Feedstock (Crude Oil and NGL) Rate to Topping Unit(s):	250
Process Unit Rates:	Input in Table 2

(*3)

FLOW RATES	K gal/day	gpm
Ballast Flow:	24 48	
Stormwater Calculations	sq feet	acres
Process area, sq. ft. (or acres):		
Number of Days (Default is 365):	365	
	inches	% runoff
Annual rainfall, inches:		
	K gal/day	
Contaminated Stormwater to Treatment System	674.5	

(*4)

RATIOS:	Ratio:
TOC:BOD5 (Default is 2.2, if needed):	

(*5)

	Fraction:
Discharge fraction, default =1	1

(*6)
ANTI-BACKSLIDING INFORMATION:

PARAMETER	(*A) Tech Old Avg lb/day	(*B) Tech Old Max lb/day	(*C) Antiback 0=no scr. 1=OldvsGL 2=Old+GL
Conventional:			
BOD5			---
TSS			---
Oil and Grease			---
Nonconventional:			
COD			---
TOC			---
Ammonia			---
Sulfide			---
Total Phenolics			---
Metals:			
Chromium (Total)			---
Chromium (6+)			---

(*7)
Conversion Utilities:

mg/L-->lbs/day	8.34
gpm-->MGD	0.00144
gpm-->K gal/day	1 44
ft3-->gal	7.480519
inches-->feet	0.083333
acres-->sq. ft.	43560

Calculation of Technology Based Limits for Motiva Enterprises LLC, Convent Refinery

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Calculation of Unit Process Rates and Unit Configuration Factors

TABLE 2

(*1)	(*2) EPA Process Number	(*3) Unit Process Rate K bbl/day	(*4) Total Feedstock Rate	(*5) Unit Process Rate to Feedstock Rate Ratio *	(*6) Process Weighting Factor =	(*7) Unit Process Config. Factor
CRUDE PROCESSES:						
Atmospheric Crude Distillation	1	250	250	1	1	1
Crude Desalting	2	250	250	1	1	1
Vacuum Crude Distillation	3	96.43	250	0.38572	1	0.38572
TOTAL CRUDE PROCESSES FEEDSTOCK RATE=		596 43				
CRACKING AND COKING PROCESSES:						
Visbreaking	4	15	250	0 06	6	0.36
Thermal Cracking	5	0	250	0	6	0
Fluid Catalytic Cracking	6	90	250	0.36	6	2.16
Moving Bed Catalytic Cracking	7	0	250	0	6	0
Hydrocracking	10	58	250	0 232	6	1.392
Delayed Coking	15	0	250	0	6	0
Fluid Coking	16	0	250	0	6	0
Hydrotreating	54	195.5	Not Applicable to Refinery Process Config. Factor			
TOTAL CRACKING AND COKING PROCESSES FEEDSTOCK RATE=		358.5				
LUBE PROCESSES:						
Hydrofining, Hydrofinishing, Lube Hydrofinishing	21	0	250	0	13	0
White Oil Manufacture	22	0	250	0	13	0
Propane: Dewaxing, Deasphalting, Fractioning, Deresining	23	0	250	0	13	0
Duo Sol, Solvent Treating, Solvent Extraction, Duotreating, Solvent Dewaxing, Solvent Deasphalt	24	0	250	0	13	0
Lube Vacuum Tower, Oil Fractionation, Batch Still (Naphtha Strip), Bright Stock Treating	25	0	250	0	13	0
Centrifuge and Chilling	26	0	250	0	13	0
Dewaxing, MEK, Ketone, MEK-Toluene	27	0	250	0	13	0
Deoiling (Wax)	28	0	250	0	13	0
Naphthenic Lube Production	29	0	250	0	13	0
SO2 Extraction	30	0	250	0	13	0
Wax Pressing	34	0	250	0	13	0
Wax Plant (with Neutral Separation)	35	0	250	0	13	0
Furfural Extracting	36	0	250	0	13	0
Clay Contacting - Percolation	37	0	250	0	13	0
Wax Sweating	38	0	250	0	13	0
Acid Treating	39	0	250	0	13	0
Phenol Extraction	40	0	250	0	13	0
TOTAL LUBE PROCESS FEEDSTOCK RATE=		0				

Calculation of Technology Based Limits for Motiva Enterprises LLC, Convent Refinery

Outf. 001

Calculation of Unit Process Rates, Unit Configuration, Process and Size Factors

TABLE 2 (continued)

(*1)	(*2) EPA Process Number	(*3) Unit Process Rate K bbl/day	(*4) Total Feedstock Rate	(*5) Unit Process Rate to Feedstock Rate Ratio *	(*6) Weighting Factor =	(*7) Unit Process Config. Factor
ASPHALT PROCESSES:						
Asphalt Production	18	0	250	0	12	0
200 Deg. F Softening Point Unfluxed Asphalt	32	0	Not Applicable to Refinery Process Config. Factor			
Asphalt Oxidizing	43	0	250	0	12	0
Asphalt Emulsifying	89	0	250	0	12	0
TOTAL ASPHALT PROCESS FEEDSTOCK RATE=		0				
REFORMING AND ALKYLATION PROCESSES:						
H2SO4 Alkylation	8	20	Not Applicable to Refinery Process Config. Factor			
Catalytic Reforming	12	46	Not Applicable to Refinery Process Config Factor			
TOTAL REFORMING AND ALKYLATION PROCESS FEEDSTOCK RATE=		66				
TOTAL REFINERY PROCESS CONFIGURATION FACTOR=						6.3

TABLE 3

PROCESS FACTORS BY SUBPART

Total Refinery Process Configuration	Cracking Subpart B
< 2.49	0.58
2.5 to 3.49	0.63
3.5 to 4.49	0.74
4.5 to 5.49	0.88
5.5 to 5.99	1
6.0 to 6.49	1.09
6.5 to 6.99	1.19
7.0 to 7.49	1.29
7.5 to 7.99	1.41
8.0 to 8.49	1.53
8.5 to 8.99	1.67
9.0 to 9.49	1.82
9.5 to 9.99	1.89
10.0 to 10.49	1.89
10.5 to 10.99	1.89
11.0 to 11.49	1.89
11.5 to 11.99	1.89
12.0 to 12.49	1.89
12.5 to 12.99	1.89
13.0 to 13.49	1.89
13.5 to 13.99	1.89
>=14.00	1.89

Multiplier = Feedstock * Process Factor * Size Factor

Multiplier = 384.225

TABLE 4

SIZE FACTORS BY SUBPART

K bbl/day Feedstock (Stream Day)	Cracking Subpart B
< 24.9	0.91
25.0 to 49.9	0.95
50.0 to 74.9	1.04
75.0 to 99.9	1.13
100.0 to 124.9	1.23
125.0 to 149.9	1.35
150.0 to 174.9	1.41
175.0 to 199.9	1.41
200.0 to 224.9	1.41
>=225.0	1.41

PROCESS FACTOR INPUT:

Refinery Configuration = 6.3

SIZE FACTOR INPUT:

Feedstock, K bbl/day = 250

		FACTOR REFERENCE
PROCESS FACTOR =	1.09	419.23(b)
SIZE FACTOR =	1.41	419.23(b)

TABLE 5

PROCESS GROUP FEEDSTOCK RATES:

Process Group:	Feedstock Rate, K bbl/day:
Crude=	596.43
Cracking and Coking=	358.5
Lube=	0
Asphalt=	0
Reforming and Alkylation=	66

Calculation of Technology Based Limits for Motiva Enterprises LLC, Convent Refinery

Out. 001

Conventional, nonconventional, and toxic refinery pollutant loading calculations

TABLE 6

40 CFR 419, Petroleum and Refining Guidelines

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)
	REFERENCES		FACTORS:				LOADINGS:	
			Cracking Subpart B lb/K bbl Avg	Cracking Subpart B lb/K bbl Max		Discharge Fraction Through Outfall	Cracking Subpart B lb/day Avg	Cracking Subpart B lb/day Max
PROCESS WASTEWATER PARAMETER	Subpart B Category Cracking	Treatmt Tech.			Multiplier			
Conventional:								
BOD5	419.24(a)	BCT	5.5	9.9	384.225	1	2113.238	3803.828
TSS	419.24(a)	BCT	4.4	6.9	384.225	1	1690.59	2651.153
Oil and Grease	419.24(a)	BCT	1.6	3	384.225	1	614.76	1152.675
Nonconventional.								
COD	419 23(a)	BAT	38.4	76	384.225	1	14754.24	29432.65
TOC	---	---	---	---	384.225	1	---	---
Ammonia	419.23(a)	BAT	3	6.6	384.225	1	1152.675	2535.885
Sulfide	419.23(a)	BAT	0.029	0.065	384.225	.1	11.14253	24.97463
BPT Calculations for Total Recoverable Phenolics, Total Chromium, and Chromium (6+)								
Total Phenolics	419.22(a)	BPT	0 036	0.074	384.225	1	13.8321	28.43265
Chromium (Total)	419.22(a)	BPT	0 088	0.15	384.225	1	33.8118	57 63375
Chromium (6+)	419.22(a)	BPT	0.0056	0 012	384.225	1	2.15166	4.6107
BAT Calculations for Total Recoverable Phenolics, Total Chromium, and Chromium (6+)								
					Table 2 Rate, K bbl/day			
Total Phenolics								
Crude Processes	419.23(c)	BAT	0 003	0.013	596.43	1	1 78929	7.75359
Cracking & Coking	419.23(c)	BAT	0 036	0.147	358.5	1	12.906	52 6995
Asphalt Processes	419.23(c)	BAT	0.019	0.079	---	---	---	---
Lube Processes	419.23(c)	BAT	0.09	0.369	---	---	---	---
Reforming and Alkylation	419.23(c)	BAT	0.032	0.132	66	1	2.112	8.712
Total Phenolics BAT:							16.80729	69 16509
Chromium (Total)								
Crude Processes	419.23(c)	BAT	0.004	0.011	596.43	1	2.38572	6.56073
Cracking & Coking	419.23(c)	BAT	0.041	0.119	358.5	1	14.6985	42.6615
Asphalt Processes	419.23(c)	BAT	0.022	0.064	---	---	---	---
Lube Processes	419.23(c)	BAT	0.104	0.299	---	---	---	---
Reforming and Alkylation	419.23(c)	BAT	0.037	0.107	66	1	2 442	7.062
Total Chromium BAT:							19.52622	56.28423

Calculation of Technology Based Limits for Motiva Enterprises LLC, Convent Refinery

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Conventional, nonconventional, and toxic refinery pollutant loading calculations

TABLE 6 (continued)

40 CFR 419, Petroleum and Refining Guidelines

(*1) PROCESS WASTEWATER PARAMETER	(*2) REFERENCES: Subpart B Category: Cracking	(*3) Treatmt. Tech	(*4) FACTORS, Cracking Subpart B lb/K bbl Avg	(*5) Cracking Subpart B lb/K bbl Max	(*6) Table 2 Group Feedstock Rate, K bbl/day	(*7) Discharge Fraction Outfall	(*8) LOADINGS, Cracking Subpart B lb/day Avg	(*9) Cracking Subpart B lb/day Max
Chromium (6+)								
Crude Processes	419.23(c)	BAT	0.0063	0.0007	596.43	1	0.178929	0.417501
Cracking & Coking	419.23(c)	BAT	0.0034	0.0076	358.5	1	1.2189	2.7246
Asphalt Processes	419.23(c)	BAT	0.0019	0.0041	---	---	---	---
Lube Processes	419.23(c)	BAT	0.0087	0.0192	---	---	---	---
Reforming and Alkylation	419.23(c)	BAT	0.0031	0.0069	66	1	0.2046	0.4554
Chromium (6+) BAT:							1.602429	3.597501

Apply Most Stringent (BAT or BPT) for Total Recoverable Phenolics, Total Chromium, and Chromium (6+):

Total Phenolics	--	---	---	---	---	13.8321	28.43265
Chromium (Total)	---	---	---	---	---	19.52622	56.28423
Chromium (6+)	---	---	---	---	---	1.602429	3.597501

BALLAST WATER PARAMETER	Subpart B Category: Cracking	Treatmt. Tech.	Cracking Subpart B lb/K gal Avg	Cracking Subpart B lb/K gal Max	Flow K gal/day	Discharge Fraction Through Outfall	Cracking Subpart B lb/day Avg	Cracking Subpart B lb/day Max
Conventional								
BOD5	419.24(c)	BCT	0.21	0.4	24.48	1	5.1408	9.792
TSS	419.24(c)	BCT	0.17	0.26	24.48	1	4.1616	6.3648
Oil and Grease	419.24(c)	BCT	0.067	0.126	24.48	1	1.64016	3.08448
Nonconventional								
COD	419.23(d)	BAT	2	3.9	24.48	1	48.96	95.472
TOC	---	---	---	---	24.48	1	---	---

Calculation of Technology Based Limits for Motiva Enterprises LLC, Convent Refinery

Out. 001

Conventional, nonconventional, and toxic refinery pollutant loading calculations

TABLE 6 (continued)

40 CFR 419, Petroleum and Refining Guidelines

(*1) STORMWATER PARAMETER	(*2) Subpart B Category. Cracking	(*3) Treatmt. Tech.	(*4) Cracking Subpart B lb/K gal Avg	(*5) Cracking Subpart B lb/K gal Max	(*6) Flow K gal/day	(*7) Discharge Fraction Through Outfall	(*8) Cracking Subpart B lb/day Avg	(*9) Cracking Subpart B lb/day Max
Conventional								
BOD5	419.24(e)	BCT	0.27	0.4	674.5	1	168.39	269.8
TSS	419.24(e)	BCT	0.18	0.28	674.5	1	121.41	188.86
Oil and Grease	419.24(e)	BCT	0.067	0 13	674 5	1	45.1915	87.685
Nonconventional								
COD	419.23(f)	BAT	1.5	3	674 5	1	1011.75	2023.5
TOC	---	---	---	---	674.5	1	---	---
Total Phenolics	419.23(f)	BAT	0.0014	0 0029	674.5	1	0.9443	1.95605
Metals								
Chromium (Total)	419.23(f)	BAT	0.0018	0.005	674.5	1	1.2141	3.3725
Chromium (6+)	419.23(f)	BAT	0.00023	0.00052	674.5	1	0.155135	0.35074

TABLE 7

TOTAL ALLOCATIONS = Process WW + Ballast Water + Contaminated SW (lbs/day)

PARAMETER	PROCESS WASTEWATER (*1) Cracking Subpart B lb/day Avg	(*2) Cracking Subpart B lb/day Max	BALLAST (*3) Cracking Subpart B lb/day Avg	(*4) Cracking Subpart B lb/day Max	STORMWATER (*5) Cracking Subpart B lb/day Avg	(*6) Cracking Subpart B lb/day Max	TOTAL ALLOCATION (*7) Cracking Subpart B lb/day Avg	(*9) Cracking Subpart B lb/day Max
Conventional								
BOD5	2113.238 3603.828		5.1408	9.792	148.39	269.8	2266.768	4083.42
TSS	1690.59	2651.153	4.1616	6.3648	121.41	188 86	1816.162	2846.377
Oil and Grease	614.76	1152.675	1.64016	3.08448	45 1915	87.685	661.5917	1243.444
Nonconventional								
COD	14754.24	28432.65	48.96	95 472	1011.75	2023.5	15814.95	30551.62
TOC	---	---	---	---	---	---	---	---
Ammonia	1152.675	2535.885	---	---	---	---	1152.675	2535.885
Sulfide	11 14253	24.97463	---	---	---	---	11 14253	24.97463
Total Phenolics	13 8321	28.43265	---	---	0 9443	1 95605	14 7764	30.3887
Metals								
Chromium (Total)	19.52622	56.28423	---	---	1.2141	3.3725	20.74032	59.65673
Chromium (6+)	1.602429	3.597501	---	---	0.155135	0.35074	1.757564	3.948241

RESPONSE TO COMMENTS
FINAL PERMIT DECISION

This is LDEQ's response to comments received on the subject draft permit in accordance with regulations promulgated at LAC 33:IX.3125.

LPDES Permit No.:	LA0006041
Agency Interest No.:	2719
Applicant:	Motiva Enterprises LLC Convent Refinery Post Office Box 37 Convent, Louisiana 70723
Issuing Office:	Louisiana Department of Environmental Quality (LDEQ) Office of Environmental Services Post Office Box 4313 Baton Rouge, Louisiana 70821-4313
Prepared By:	Heather Babin Permits Division Phone #: 225-219-3138 E-mail: heather.babin@la.gov
Permit Action:	Final permit decision and response to comments received on the draft permit publicly noticed on February 12, 2004, in the local newspaper, the NEWS-EXAMINER of Lutcher; through mailing to those persons included in the Office of Environmental Services Public Notice Mailing List on February 11, 2004; and through publication on the Office of Environmental Services Public Notices Web Site.
Date Prepared:	March 24, 2004

RESPONSE TO COMMENT(S)

The comment(s) regarding LPDES Permit LA0006041 have been received and evaluated. The comment(s) and this Office's response(s) are summarized below.

Issue No. 1
The factsheet references basin and segment - Lake Pontchartrain Basin, Segment 040401. Motiva believes that this should be Segment 040403.

Response to Issue No. 1
The Louisiana Department of Environmental Quality Office of Environmental Services (LDEQ-OES) concurs with the permittee's comment; however, the factsheet is a document that is designed to accompany a draft permit rather than a final permit. That document won't be changed, but this document will serve to update the record.

Issue No. 2
Part 1; Page 2 to 3 of 6: In regards to the material Motiva is authorized to discharge from Outfall 001. Sour water stripper effluent was specifically listed in the permit application as a separate stream for Outfall 001. It is not listed as a separate stream in the draft permit. Motiva requests that the LA DEQ

please clarify in the permit that the "treated process wastewaters" shown in the draft permit covers the stripped sour water.

Response to Issue No. 2
The LDEQ-OES concurs with the permittee's request and the appropriate corrections have been made.

Issue No. 3
Part 1; Page 2 to 3 of 6: In regards to the material Motiva is authorized to discharge from Outfall 001. In the permit application, Motiva had a separate listing for Miscellaneous Waste Waters which included sand filter backwash, service water return, heat exchanger backwashes, unit wash down, sulfur rack water spray, maintenance, I&T, chemical cleaning bundle cleaning wastes, area wash down, steam trap condensate, and other miscellaneous streams. Motiva requests that the LA DEQ please clarify in the permit that these streams would be the streams referenced by the draft permit as utility wastewaters.

Response to Issue No. 3
The LDEQ-OES concurs with the permittee's request and the appropriate corrections have been made.

Issue No. 4
Part 1; Page 2 to 3 of 6: Most of the proposed limits listed for 001 for the conventional and non-conventional pollutants are slightly lower than the proposed limits that were contained in the Supplemental Information report submitted to the LA DEQ in August 2002. Motiva requests that the limits in the draft permit be revised to reflect the proposed limits in the Supplemental Information report. Falling that, Motiva requests that the LA DEQ clarify how the different limits were arrived at from those proposed in the Supplemental Information report.

Response to Issue No. 4
The LDEQ-OES concurs with the permittee's request and the appropriate corrections have been made. The corrected Appendix A-1 is also attached to the final permit.

Issue No. 5
Part 1; Page 2 to 3 of 6: The monitoring requirements for pH and flow are shown as continuous recorder. Motiva requests that the continuous recording requirement be met via electronic data collection and storage from our process computer system, and that this be documented as acceptable in the permit.

Response to Issue 5
The LDEQ-OES concurs with the permittee's request and the appropriate corrections have been made. See Part II.P.

Issue No. 6
Part 1; Page 2 to 3 of 6: In regards to the Whole Effluent (Acute) Toxicity Testing, the draft permit requires that samples shall be flow-weighted with Outfall 004 and the results be reported on the DMR as 001. It is anticipated that the discharge via 004 will be infrequent, with the possibility that we will not utilize this outfall during a year's time. During periods when 004 is being utilized, the percentage of rainwater directed through the biological system would be substantially higher than normal treatment conditions. Motiva requests that the permit condition state that this condition to require toxicity sampling of 004 is only required when this discharge is occurring at the same time as the scheduled toxicity testing of 001 would be being performed.

Response to Issue No. 6
In an E-mail dated March 25, 2004, Motiva has agreed not to create Outfall 004. This Outfall and all references to Outfall 004 have been removed from the permit. Therefore, the biomonitoring will only occur at Outfall 001 and flow-weighted samples will not be required.

Issue No. 7
Part 1; Page 4 of 6: In regards to the material Motiva is authorized to discharge from Outfall 002. In the permit application, Motiva requested that we would be authorized to discharge fire-testing water through Outfall 002. Fire-testing water was described as including: Mississippi River water from the fire water pond used to flush fire hydrants and monitors; Mississippi River water from the water system used to flow test the facility fire trucks; and Fire water and foam from fire fighting efforts within the facility. The draft permit application only lists monthly hydrant flush. Motiva requests that LA DEQ incorporate the above listed stream, collectively referred to as fire-testing water, into the permit as allowable discharges from this outfall. Please note that as per the permit application, this type of material will only be discharged when test results confirm that the material meets permit limits prior to discharge.

Response to Issue No. 7
The LDEQ-OES concurs with the permittee's request and the appropriate corrections have been made. Please note that any pre-planned discharges (non-emergency situation) of fire fighting foam must have written, prior approval by this Office.

Issue No. 8
Part 1; Page 6 of 6: In regards to the material Motiva is authorized to discharge from Outfall 004. Footnote 1 details what an emergency condition is for this outfall : "An emergency condition exists when the wastewater surge capacity (Tanks 36T-314, -315, -316, and -317) at or above 75% of rated storage volume, and South Surge Pond at or above 75% of rated storage volume with more than ½ inch of rain anticipated over the next 24-hours. Refinery management must approve of use of this outfall." In the permit application, Motiva has requested that the authorization to utilize this outfall also include when refinery management deems any condition exists which would threaten to cause an uncontrolled release of wastewater and/or pose a threat to human health, the environment, or vital plant equipment. We therefore request that this condition also be incorporated for Outfall 004.

Response to Issue No. 8
In an E-mail dated March 25, 2004, Motiva has agreed not to create Outfall 004. This Outfall and all references to Outfall 004 have been removed from the permit.

Issue No. 9
Part 1; Page 6 of 6: In regards to the material Motiva is authorized to discharge from Outfall 004. Footnote number 2 states: "Discharge limitations apply to the sum of Outfall 004 and 001. Each outfall shall be independently monitored. The results from each individual outfall (004 and 001) shall be reported along with the sum total." Motiva intends to utilize the same discharge pipe to the Mississippi River for Outfall 004 that it utilizes for 001. This allows the existing continuous process monitoring equipment and composite sampler to measure the combined discharge to the Mississippi River from Outfalls 001 and 004. Motiva's interpretation of this condition is that in addition to the existing requirements at the normal monitoring point for 001, we would also be required to also take grab samples for both 001 and 004 ahead of the point they would co-mingle. These grab sample concentration results would be reported along with the flow weighted, grab and composite samples (e.g.,

mass discharge quantities) from the normal 001 monitoring point for the combined flow. Motiva requests that LA DEQ include additional detail in the permit to clarify this requirement.

Response to Issue No. 9
In an E-mail dated March 25, 2004, Motiva has agreed not to create Outfall 004. This Outfall and all references to Outfall 004 have been removed from the permit.

Issue No. 10
Part 1; Page 6 of 6: In regards to the material Motiva is authorized to discharge from Outfall 004. Footnote 6 requires that biomonitoring samples shall be flow-weighted with Outfall 001 and the results shall be reported on the DMR as 001. Motiva interprets this condition to mean that if we are discharging to the Mississippi River through 004 at the same time the annual biomonitoring is occurring, then sampling shall be done of both streams (001 and 004) prior to them being commingled, and the results be reported flow-weighted for each outfall. Motiva requests that LA DEQ clarify that this condition does not require that we are required to perform biomonitoring of the 004 outfall at least one a year. This outfall not necessarily be utilized every year. Another consideration on the feasibility of performing biomonitoring for this outfall is that it will normally be utilized only during emergency conditions. It will be difficult to arrange for a representative sample under these conditions.

Response to Issue 10
In an E-mail dated March 25, 2004, Motiva has agreed not to create Outfall 004. This Outfall and all references to Outfall 004 have been removed from the permit.

Issue No. 11
Part II. Under J. Minimum Quantification Level, three compounds are listed (phenolics, total chromium and hexavalent chromium). Does the LA DEQ have an MQL limit determined for Oil & Grease? Since changing to EPA Method 1664, our O&G analysis have routinely yielded results which have been at or below the detection limit as measured by out contract laboratory. If so, we would like this MQL incorporated into this permit condition.

Response to Issue 11
LDEQ has no standardized Minimum Quantification Level (MQL) for Oil & Grease; therefore, one will not be incorporated into the final permit.

Issue No. 12
Part II. Section M.5.e and h - These sections reference requirements contained within the SPCC / SPC and waste regulations. It is worth noting that Motiva is presently working with LA DEQ enforcement on compliance with certain SPCC / SPC requirements. The compliance schedule is still pending, however, some of these issues may not be completely addressed within six months of this permit being effective due to long term construction requirements.

Response to Issue No. 12
The SWP3 is designed to be broad enough that it can encompass issues such as this. However, the SWP3 must be updated to show any and all changes that effect stormwater discharges.

State of Louisiana
Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Mr. Louis Kliebert
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Mr. Kliebert:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statute 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Mr. Jason Amato
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Mr. Amato:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

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If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter 10-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Mr. Charles Morton
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Mr. Morton:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana
Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Ms. Tammy Frank
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Ms. Frank:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Ms. Charlene Williams
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Ms. Williams:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Mr. Mac Bordelon
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Mr. Bordelon:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Mr. John Doucet
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Mr. Doucet:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Ms. Dolores Florent
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Ms. Florent:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

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If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter

IO-W

Heather Babin
Permits Division

State of Louisiana

Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Mr. Lloyd Becnel
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Mr. Becnel:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

Pursuant to La. R.S. 30.2050.21, an aggrieved person may appeal a final permit action to the Nineteenth Judicial District Court for the parish of East Baton Rouge. A motion for an appeal must be filed with the Secretary within thirty days after notice of the action.

If you have any questions, please contact Heather Babin, Office of Environmental Services, Permits Division, at the address on the bottom of the page or telephone (225) 219-3138. All future correspondence regarding this permit shall use the Agency Interest (AI) number 2719 and LPDES permit number LA0006041.

Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana
Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Ms. Brenda Melancon
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Ms. Melancon:

In your letter received by this Office on March 1, 2004, the St. James Parish Economic Development Board requested that the Louisiana Department of Environmental Quality (LDEQ) grant the issuance of a final LPDES permit to Motiva Enterprises, LLC.

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Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter IO-W

Heather Babin
Permits Division

State of Louisiana
Department of Environmental Quality

KATHLEEN BABINEAUX BLANCO
GOVERNOR

MIKE D. McDANIEL, Ph.D.
SECRETARY

CERTIFIED MAIL 7003 2260 0006 0165 9041

File No.: LA0006041
AI No.: 2719
Activity No.: PER20020005

Ms. Camella Landry
St. James Parish
Economic Development Board Member
Post Office Box 629
Gramercy, LA 70052

RE: Final permit decision and response to comments received regarding the draft Louisiana Pollutant Discharge Elimination System (LPDES) Permit, LA0006041, for Motiva Enterprises, LLC, located on Louisiana Highway 44 at Louisiana Highway 70 in Union, St. James Parish.

Dear Ms. Landry:

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Based on a review of all comments and in accordance with Louisiana Environmental Quality Act (Louisiana Revised Statue 30.2001 et seq.) and the Clean Water Act (33 U.S.C. 1251 et seq.), the LDEQ-OES has decided to issue the LPDES permit, LA0006041, to Motiva Enterprises, LLC. This Office's responses to Motiva Enterprises, LLC's comments and a copy of the final LPDES Permit, LA0006041, are attached.

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Sincerely,

Karen K. Gautreaux
Deputy Secretary

hb
Attachments

c: cover letter 10-W

Heather Babin
Permits Division

ATTACHMENT A

Permit No. LA0006041

Company Name: Motiva Enterprises LLC
Address: Post Office Box 37
Convent, Louisiana 70723

1. Other than "cosmetic changes" such as correcting typos and grammatical errors, is the final permit different from the draft permit?

✓ YES ____ NO

If yes, what differences exist? See Response to Comments

2. Did the company request changes in the permit after the draft was issued?

✓ YES ____ NO

If yes, what changes were requested? See response to comments

Were the changes incorporated into the final permit?

✓ YES ____ NO

3. Did the public request changes in the permit after the draft was issued?

____ YES ✓ NO

If yes, what changes were requested?

Were the changes incorporated into the final permit?

____ YES ____ NO

Heather Babin

From: Troxler, Beth M MOTIVA [BMTroxler@motivaenterprises.com]
Sent: Thursday, March 25, 2004 11:00 AM
To: Heather Babin
Subject: 004 Outfall - Comment for Draft Permit

In regards to your 03/25/04 phone call regarding 004 outfall:

Motiva recognizes the issues raised regarding appropriate monitoring of 004 when discharged. We therefore are agreeable to the deletion of the 004 outfall from the draft permit We understand that per the provisions of Part 3 B.4, the bypass language is sufficient to cover the bypass of the process waste water treatment unit during emergency situations. Normal sampling of the combined discharge will be done at the normal sampling point for 001.

Beth M. Troxler
Staff Engineer - Environmental
Motiva Enterprises LLC
Convent Refinery Environmental Dept.
(work) 225/562-6906
(fax) 225/562-6874
(pager) 225/377-0293
bmtroxler@motivaenterprises.com

APPENDIX I

VISUAL CLASSIFICATION OF SOILS

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP-GDC APPROX. ELEV. 10.2 Ft MSL
COORDINATES SJO -D'App E7159N3970 DRILLING METHODS Rotary 5" drag Failing 1500

PAGE 1 OF 1
BORING NO. SW-1
DATE 7-25-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
3"PVC	+2' to -25'				

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
							Fill - dense fine sand and shells 4.5'	
5								PP = 2.0
				ST-1			Stiff tan to gray silty clay, trace of organics	PP = 1.25
10				ST-2				PP = 1.5
							12.0	PP = 1.75
15				ST-3		ml	Stiff tan to gray clayey silt 16.0'	PP = 1.75 PP = 2.5
20				ST-4			Stiff to very stiff tan to gray silty clay, trace of calcareous sand at 20 feet	PP = 1.5 PP = 1.25
25				ST-5				PP = 2.5 PP = 3.0
							Bottom of boring at 25.0 feet	Borehole reamed with 8" drag bit.

NOTES: Bottom of casing -23'; blank section -23' to -18'; screen section -18' to -13'; sand placed from bottom of hole to -11'; bentonite pellets placed from -11' to -10 '. Cement bentonite grout placed to top of the borehole

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-950
FIELD ENG./GEO JP-GDC,SJO-D'AD APPROX. ELEV. 8.5 ft MSL
COORDINATES E6541 N3154 DRILLING METHODS Rotary Falling 1500 drag bit

PAGE 1 OF 1
BORING NO: SW-2
DATE 7-25-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
3" PVC	+3' to -32'				

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
5				ST-1			Stiff to very stiff gray and tan silty clay	PP = 3.75 PP = 1.75
10				ST-2			Trace of calcareous sand from 18 to 15 feet	PP = 1.75 PP = 1.5
15				ST-3		ch		PP = 2.25 PP = 1.0
20				ST-4				PP = 1.75 PP = 2.25
25				ST-5				PP = 2.75 PP = 3.0
30				ST-6				PP = 3.25
35							Bottom of boring at 33.0 feet	Borehole reamed with 8" drag bit before installation 3" PVC monitor well

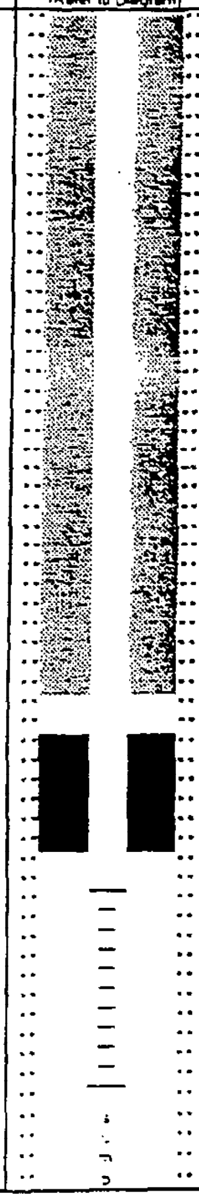
NOTES: Bottom of casing -33'; blank section -33to -28'; screened section -28' to -23'; Sand placed from bottom to -20', bentonite pellets from -20 to -18'; cement-bentonite grout placed to top of borehole.

SOIL BORING & WELL CONSTRUCTION LOG

OWNER :	Star	BORING / WELL # :	SW-2RB/SW-2R
FACILITY # :	LOUP	DATE COMPLETED :	07/2/94
ADDRESS :	P. O. Box 37	GW DEPTH (Encountered) :	25.0'
CITY, STATE :	Convent, Louisiana	GW DEPTH (Static) :	8.60'
PROJECT ID# :	947-0012	WELL T-O-C ELEVATION	13.58

DEPTH (ft)	SAMPLING Method	SAMPLING Time	PID Reading	USCS Symbol	PENET Reading	SOIL CHARACTERISTICS & REMARKS	DEPTH (ft)
2	ST	0913	0	CL	NA	Dry, brittle, dense, brown silty clay with organic matter	2
4	ST	0927	0	CL	NA	Slight increase in moisture and plasticity	4
6	ST	0930	0	CL	NA	Very moist, medium plasticity, dense gray silty clay with iron and organic staining	6
8	ST	0934	0	CL	NA	Same	8
10	ST	0940	NR	NR	NA	No recovery	10
12	ST	0945	0	CL	NA	Moist, soft, medium plasticity, gray and orange silty clay	12
14	ST	1002	0	CL	NA	Very moist, very soft, high plasticity gray silty clay	14
16	ST	1009	0	CL	NA	Same	16
18	ST	1014	0	CL	NA	Dry, hard, medium to high plasticity gray and orange silty clay	18
20	ST	1019	0	CL	NA	Same	20
22	ST	1025	0	CL	NA	Same	22
24	ST	1031	0	CL	NA	Same	24
26	ST	1310	0	CL/NR	NA	10" layer of wet, soft, gray clayey silt	26
28	ST	1315	0	CL	NA	Slightly moist, hard, medium to high plasticity gray slightly silty clay	28
30	ST	1315	0	CL	NA	Same	30

GEN WELL CONSTRUC (Refer to Diagram)



NOTES

All Times Military	NR-No Recovery	Drilling Company	Tom Griffith
*-Sample analyzed	PH-Post Hole Digger	Driller Name	Guy Griffith
GW-Groundwater	SS-Split Spoon	Drill Rig Type	CSME 55
HA-Hand Auger	ST-Shelby Tube	Drill Diam. & Meth.	10.25"/Hollow Stem
NA-Not Applicable	TD-Total Depth	SEMS, Inc. Rep	Ricky Lee
GP-Geoprobe			

Legend: Conc./Grout; Bentonite Plug; Sand Pack; Well Casing; Natural Soil

SEMS, Inc.

?:\star200-2\SW_2RB.wk4

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO JP-GDC, SJO-D'A APPROX. ELEV. 6.5 Ft. MSL
COORDINATES E7521 N1925 DRILLING METHODS Rotary Failing 1500

PAGE 1 OF 1
BORING NO SW-3
DATE 7-30-82

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
3" PVC	+2' to -33'				

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5				ST-1		ch	Soft to stiff tan to gray silty clay, trace of organics throughout	PP = 2.0 PP = 1.5
10				ST-2			11.0'	PP = 2.5 PP = 2.0
						ml	Soft to medium stiff tan to gray clayey silt 14.0'	
15				ST-3		ch	Medium stiff tan to gray silty clay, trace of organics	PP = .75 PP = 2.25
20				ST-4			22.0	PP = 1.0 PP = 2.25
25				ST-5		ch	Very stiff tan to gray silty clay	PP = 2.75 PP = 3.0
30				ST-6				PP = 4.0 PP = 3.0
35				ST-7			Bottom of boring at 35.0 feet	PP = 3.0 PP = 3.5

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. SJO APPROX. ELEV. 6.5 Ft. MSL
COORDINATES E8289 N2040 DRILLING METHODS Rotary Failing 1500

PAGE 1 OF 1
BORING NO. SW-4
DATE 8-7-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
3" PVC	+2' to -38'	1400 8-7-83	13'		

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
5				ST-1		ch	Medium stiff to stiff brown to gray silty clay	
10				ST-2				
							13.0'	
15				ST-3		ml	Medium stiff gray clayey silt	
20				ST-4				
							21.0	
25				ST-5		ch	Stiff to very stiff brown to gray silty clay	PP = 2.5
30				ST-6				PP = 3.0
35							Bottom of boring at 38'	

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915

FIELD ENG./GEO. JP-GDC,SJO-D AP APPROX. ELEV. 6.5 Ft. MSL

COORDINATES E8209 N2814 DRILLING METHODS Auger, Rotary Falling 1500'

PAGE 1 OF 1

BORING NO SW-5

DATE 8-3-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
3" PVC	12' to -28'	1000 hrs 8-3-83	7.0'		

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S SYMBOL	DESCRIPTION	REMARKS
5				ST-1			Medium stiff to stiff gray to tan silty clay	PP = 2.25 PP = 2.0
						ch		
10				ST-2				PP = 1.75 PP = 1.5
15				ST-3			Medium stiff tan and gray clayey silt, trace of calcareous sand 20.0'	PP = 1.25 PP = 1.0
20				ST-4			Very stiff gray and tan silty clay	PP = 2.25
25				ST-5				
30				ST-6			Bottom of boring at 30.0 feet.	PP = 3.5 PP = 3.0

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP GDC, SJO-D'Ap APPROX. ELEV. 5.5 Ft. MSL
COORDINATES E8086 N3614 DRILLING METHODS Auger Rotary Failing 1500 5" drag bit

PAGE 1 OF 1
BORING NO. SW-6
DATE 7-26-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
5" PVC	+2 to -33	1500 hrs	12'		

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
								Borehole was augered until water table encountered at 12'
5				ST-1			Stiff to very stiff gray to tan silty clay, trace calcareous sand seams below 10 feet.	PP = 1.75
10				ST-2				PP = 1.75 PP = 1.5
15				ST-3		CH		PP = 1.75 PP = 2.50
20				ST-4				PP = 1.75 PP = 2.0
25				ST-5				PP = 2.5 PP = 2.75
30				ST-6			28.0' Very stiff tan to gray clayey silt, trace organics	PP = 3.5 PP = 2.75
35							Bottom of boring at 33.0 feet	

NOTES:

Bottom of casing at -33'; blank casing from -33' to -28'; screen from -28' to -23'. Sand placed from bottom to -18' and bentonite pellets placed from -18' to -17'; cement bentonite grout placed to ground surface.

BEST COPY OF THE NEXT 04 PAGES

SOIL BORING LOG

PROJECT: Monitor Well Installation - Shallow Aquifer

CLIENT: Texaco Refining and Marketing, Inc.

Boring No. SW-7

Sheet 1 of 1

FILE: 87-056

DATE: 6/10/87

TECH.: G. Bordelon

DRILLER: D. Thibodaux

BORING ADVANCE METHOD

Auger: 0' - 12'

Wash: 12' - 30'

RIG: 200 Buggy

METHOD OF BACKFILLING: Set Well

FIELD DATA: Depth (Feet)	Standard Penetration Test / Compressive Strength (TSF)	Description
	No (P)	Hard desiccated Tan Clay with shell
	2.2 (P)	becoming very stiff
5	2.1 (P)	Medium Gray & Tan Clay with ferrous nodules
	1.7 (P)	Medium Light Gray Slightly Silty Clay
	1.3 (P)	Medium Light Gray & Tan Clay with silt pockets
10	2.2 (P)	Medium Light Gray & Tan Silty Clay with ferrous nodules
	1.8 (P)	Soft to Medium Light Gray Silty Clay
15	1.6 (P)	with calcareous nodules
	2.2 (P)	with ferrous nodules
	2.8 (P)	
20	1.9 (P)	Medium to Stiff Light Gray & Tan Clay with silt pockets & calcareous nodules
	1.6 (P)	
25	2.2 (P)	becoming reddish brown
	2.0 (P)	with large calcareous nodules
	2.2 (P)	with silt traces
30		Bottom at 30'

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Free Water First Encountered

NOTE: Visual Classification Only

Undisturbed Sample 3 inch o.d. Shelby Tube

Water Level after 15 minutes (Prior To Wash Boring)

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Monitor Well Installation - Shallow Aquifer

CLIENT: Texaco Refining and Marketing, Inc.

Boring No. SW-8

Sheet 1 of 1

FILE: 87-255

DATE: 5/20/87

TECH.: G. Bordelon

DRILLER: D. Thibodaux

BORING ADVANCE METHOD

Auger: 0' - 8'

Wash: 8' - 30'

RIG: [illegible] Buggy

METHOD OF BACKFILLING: Set Well

Depth (Feet)	Field Data	Description
	No (P)	Stiff Brown Desiccated Clay with shell & ferrous nodules
	2.3 (P)	Stiff Gray Clay with shell traces
5	1.5 (P)	becoming light gray & tan
	No (P)	with organic clay and peat layer 6 - 7'
	1.7 (P)	
	[illegible] (P)	
10	1.5 (P)	with ferrous nodules
	Bag Sample	becoming very silt
15	[illegible] (P)	with less silt
	[illegible] (P)	
	[illegible] (P)	Stiff Light Gray & Tan Clay
20	[illegible] (P)	with silt pockets & calcareous nodules
	[illegible] (P)	
25	[illegible] (P)	becoming jointed
	[illegible] (P)	becoming reddish brown
	[illegible] (P)	
30		Bottom at 30'

Symbols:

Standard Penetration Test 140 lb Hammer 30" Fall

Undisturbed Sample 3 inch O.D. Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Free Water First Encountered

Water Level After 15 minutes (Prior To Wash Boring)

NOTE: Visual Classification Only

SOIL BORING LOG

PROJECT: Monitor Well Installation - Shallow Aquifer

CLIENT: Texaco Refining and Marketing, Inc.

Boring No. SW-9

Sheet 1 of 1

FILE: 97-056

DATE: 5/11/97

TECH.: G. Bordelon

DRILLER: D. Thibodaux

BORING ADVANCE METHOD

Auger: 0' - 12'

Wash: 12' - 24'

RIG: 200 Buggy

METHOD OF BACKFILLING: See Well

Depth (Feet)	Field Data	Description
	1.5 (P)	Medium Tan & Brown Clay with shell
	1.7 (P)	Fill
5	1.8 (P)	becoming light gray & brown
	1.9 (P)	with silt traces
	1.3 (P)	Soft to Medium Tan & Light Gray Silty Clay
10	No (P)	with clayey silt layers
	1.2 (P)	with ferrous nodules
15	2.2 (P)	Stiff Light Gray & Tan Clay
	1.5 (P)	with silt pockets
	1.2 (P)	with large calcareous nodules
20	1.7 (P)	becoming jointed with ferrous nodules
	1.4 (P)	
25		Bottom at 24'

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Free Water First Encountered

Undisturbed Sample 3 inch Dia. Shelby Tube

Water Level After 15 minutes (Prior To Wash Boring)

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Shear Penetrometer Test (P) Est.

NOTE: Visual Classification Only

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Monitor Well Installation - Shallow Aquifer

CLIENT: Texaco Refining and Marketing, Inc.

Boring No. SW-10

Sheet 1 of 1

FILE: 97-256

DATE: 5/21/97

TECH.: G. Bordelon

DRILLER: D. Thibodaux

BORING ADVANCE METHOD

Auger: 0' - 6'

Wash: 6' - 20'

RIG: 200 Buggy

METHOD OF BACKFILLING: Set Well

FIELD DATA: Depth (Feet)	Compressive Strength (TSF) / Penetration	Description
	No (P)	Gray & Tan Silty Sand with grass roots
	.7 (P)	Soft Brown & Tan Very Silty Clay
5	1.0 (P)	with wood & organic traces
	1.0 (P)	Medium Light Gray Clay
	1.8 (P)	with silt & organic traces
10	1.5 (P)	Soft to Medium Light Gray & Tan Silty Clay
	1.0 (P)	with ferrous nodules
15	No (P)	Tan & Light Gray Very Silty Clay
	1.7 (P)	with ferrous nodules
	1.5 (P)	becoming less silty at 20'
20		Bottom at 20'

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Undisturbed Sample 3 inch dia. Shelby Tube

No Recovery

Free Water First Encountered

Water Level After 15 minutes (Prior To Wash Boring)

NOTE: Visual Classification Only

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strength Determined With (P) Be Expect

SOIL TESTING ENGINEERS, INC.

LOG OF BORING

PROJECT: Landfarm Shallow G.W. Quality Investigation
LOCATION: Star Enterprise Louisiana Plant
Convent, Louisiana
CLIENT: Star Enterprise

BORING: SW-11
FILE: 89B338C-C
DATE: 6/19/90
TECHNICIAN: BAM
APPROVED: KL
PAGE: 1 of 1

Dry Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/f) or P.Pen.(tsf)	OVA or HNu* (ppm)	Recover (inch)				Description of Stratum
0				17				Grass and shells (FILL)
								Medium brown Silty CLAYS (CL)
								---with roots, shells, and pebbles to 2'
2				13				
								---with ferrous stains 3' to 6'
4				12				---stiff 4' to 6'
6				16				---light gray to green 6' to 8'
8				17				
10								Bottom of boring at 10'. Monitor Well SW-11 set in borehole.

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: Landfarm Shallow G.W. Quality Investigation
LOCATION: Star Enterprise Louisiana Plant
Convent, Louisiana
CLIENT: Star Enterprise

BORING: SW-12
FILE: 89B338C-C
DATE: 6/21/90
TECHNICIAN: BAM
APPROVED: KL
PAGE: 1 of 1

Dry Augered: Full Depth

DEPTH (FEET)	S.P.T.(b/f) or P.Pen.(tsf)	OVA or HNu* (ppm)	Recover (inch)				Description of Stratum
0			16				Very stiff dark brown Silty CLAYS (CL)
2			16				---with shell fragments to 4'
							---light blue-green 2' to 4'
4			12				---with ferrous stains 4' to 6'
6			19				---light gray to green 6' to 8'
8			16				---light gray to brown with slickensides below 8'
10							Bottom of boring at 10'. Monitor Well SW-12 set in borehole.

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: Landfarm Shallow G.W. Quality Investigation
LOCATION: Star Enterprise Louisiana Plant
Convent, Louisiana
CLIENT: Star Enterprise

BORING: SW-13
FILE: 89B338C-C
DATE: 6/21/90
TECHNICIAN: BAM
APPROVED: KL
PAGE: 1 of 1

Dry Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/f) or P.Pen.(tsf)	OVA or HNu* (ppm)	Recover (inch)				Description of Stratum
0								Stiff dark brown silty CLAYS (CL)
								---with shell fragments to 2'
2				17				---very stiff dark brown to light gray 2' to 4'
4				18				---soft with slickensides below 4'
								---with ferrous stains 4' to 6'
6				19				
								---blue-green below 7'
8				19				
10								Bottom of boring at 10'. Monitor Well SW-13 set in borehole.

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: Landfarm Shallow G.W. Quality Investigation
LOCATION: Star Enterprise Louisiana Plant
Convent, Louisiana
CLIENT: Star Enterprise

BORING: SW-14
FILE: 89B338C-C
DATE: 6/21/90
TECHNICIAN: BAM
APPROVED: KL
PAGE: 1 of 1

Dry Augered: Full Depth

DEPTH (FEET)	S.P.T.(b/f) or P.Pen.(tsf)	OVA or HNu* (ppm)	Recover (inch)				Description of Stratum
0			24				Grass - roots (FILL)
							Very stiff dark brown Silty CLAYS (CL)
2			26				---soft to medium 2' to 4'
							---with shell fragments to 4'
4			18				---light gray to dark gray with slickensides and ferrous stains 4' to 6'
6			16				---medium 6' to 8'
8			12				---soft below 8'
							Bottom of boring at 9' Monitor Well SW-14 set in borehole.

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: Landfarm Shallow G.W. Quality Investigation
LOCATION: Star Enterprise Louisiana Plant
Convent, Louisiana
CLIENT: Star Enterprise

BORING: SW-15
FILE: 89B338C-C
DATE: 6/20/90
TECHNICIAN: BAM
APPROVED: KL
PAGE: 1 of 1

Dry Augered: Full Depth

DEPTH (FEET)	SAMPLE	S.P.T.(b/f) or P.Pen.(tsf)	OVA or HNu* (ppm)	Recover (inch)				Description of Stratum
0				17				Grass - roots (FILL)
								Stiff dark gray Silty CLAYS (CL)
								---with shell fragments to 3'
2				18				
4				11				---ferrous stains 4' to 6'
6				16				
8								Bottom of boring at 8'. Monitor Well SW-15 set in borehole.

Unified Soil Classifications based on visual observations.

LOG OF BORING

PROJECT: Landfarm Shallow G.W. Quality Investigation
LOCATION: Star Enterprise Louisiana Plant
Convent, Louisiana
CLIENT: Star Enterprise

BORING: SW-16
FILE: 89B338C-C
DATE: 6/20/90
TECHNICIAN: BAM
APPROVED: KL
PAGE: 1 of 1

Dry Augered: Full Depth

DEPTH (FEET)	S.P.T.(b/f) or P.Pen.(tsf)	OVA or HNu* (ppm)	Recover (inch)				Description of Stratum	
0			18				Grass-roots	(FILL)
							Stiff brown Silty CLAYS	(CL)
							---with roots to 2'	
2			18				---soft with ferrous stains 2' to 4'	
4			19				---medium 4' to 6'	
6			16				---light gray to brown 6' to 8'	
8			22					
							---with wood fibers at 9'	
10			12				---with ferrous stains below 10'	
							Bottom of boring at 10.5'. Monitor Well SW-16 set in borehole.	

Unified Soil Classifications based on visual observations.

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SWB1-915

FIELD ENG./GEO. JP GDC, SJO DAB APPROX. ELEV. 9.1 Ft. MSL

COORDINATES ES5809N4055 DRILLING METHODS Auger Rotary Failing 1500

PAGE 1 OF 4
BORING NO. MW-1A
DATE 7-26-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
None		7/26 1700			
		7/27 0800			

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
5				ST-1			Stiff to very stiff tan and gray silty clay, trace of organics and calcareous sand seams	PP = 1.25
10				ST-2				PP = 1.5
15				ST-3				PP = 2.0 PP = 1.25
20				ST-4				PP = 1.75 PP = 2.25
25				ST-5				PP = 2.25 PP = 3.5
30				ST-6				PP = 2.75 PP = 3.0
35				ST-7				PP = 3.75
40				ST-8				PP = 3.25 PP = 4.0
45								

NOTES:

Borehole MW1A observation hole
Monitor Well MW1 placed in borehole MW1B

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP-GDC SJD APPROX. ELEV.
COORDINATES DRILLING METHODS Rotary Failing 1500

PAGE 2 OF "
BORING NO. MW-1A
DATE 7-26-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
50				ST-9			Stiff to very stiff tan to gray silty clay, becoming clayey silt from 54' to 58', and below 68'. 2" brown peat layer at 69'	PP = 2.25 PP = 2.0
55								
60				ST-10				PP = 2.75 PP = 3.25
65								
70				ST-11				PP > 4.5 PP = 4.0
75								
80				ST-12				PP = 3.25 PP = 4.0
85								
90				ST-13			90.0	PP > 4.5

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP-GDL,SJO-D,AP APPROX. ELEV.
COORDINATES DRILLING METHODS Rotary Failing 1500

PAGE 4 OF 4
BORING NO. MW-1A
DATE 7-26-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S SYMBOL	DESCRIPTION	REMARKS
140				ST-15		ml-ch	Hard gray clayey silt to silty clay	PP > 4.5
145								
150				ST-16				PP = 2.5 PP = 4.0
155								
160				ST-17			Bottom of boring at 160.0 feet	PP > 4.5

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP-CDC APPROX. ELEV. 9.1 Ft MSL
COORDINATES ES829N4055 DRILLING METHODS Rotary

PAGE 1 OF 1
BORING NO MW-1B
DATE 7-28-83

Tailing 1500

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
4" PVC	92 to 118				

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S SYMBOL	DESCRIPTION	REMARKS
						ch	Stiff to very stiff tan to gray silty clay	
90				ST-1			92.5	PP>4.5
95				ST-2		ch	Very stiff bluish gray silty clay, trace of sandy silt lenses interbedded, dry.	PP = 3.75
100				ST-3			102.5	PP = 3.25
105		8-17-25		S-1		sm	Dense dark olive gray silty sand 107.5	
110						ch	Hard bluish gray silty clay	
115				ST-4				PP = 4.25
							Bottom of borehole at 118.0 feet	

NOTES:

MW1 placed in borehole MW-1B

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP-GDC APP APPROX. ELEV. 7.3 Ft. MSL
COORDINATES E7854 N1895 DRILLING METHODS Auger, rotary Failing 1500

PAGE 1 OF 3
BORING NO W-2
DATE 7/3083. 8/1783

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
4" PVC	+2' to -11½'				

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
							Stiff tan to gray silty clay, trace of organics and calcareous sand	
				ST-1				PP = 3.0
5						ch		PP = 1.75
10				ST-2			11.0	PP = 3.0
						ml	Stiff tan to gray clay or silt 14.0	PP - 2.0
15				ST-3				PP = 2.0
							Stiff to very stiff tan to gray silty clay.	PP = 1.75
20				ST-4				PP = 2.75
								PP = 2.50
						ch		
25				ST-5				PP = 3.25
								PP = 3.75
30				ST-6				PP = 2.75
								PP = 3.0
35				ST-7				PP = 3.75
40				ST-8				PP = 3.0
							42.0	PP = 2.0
45						ml	Medium dense gray sandy silt 45.0	Presence of this layer indicated by drilling action

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SPRl-x15

FIELD ENG./GEO. JP-GDC 530-D-APP APPROX. ELEV. Rotary

COORDINATES DRILLING METHODS Failing 1500

PAGE 2 OF 3
BORING NO MW-2
DATE 7/30/83 - 7/31/83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
							Stiff to very stiff tan to blue gray silty clay, trace of sandy silt lenses at 60'	PP = 2.75 PP = 3.25
50				ST-9				
55						ch		
60				ST-10				PP = 3.75 PP = 2.25 Boring advanced to 60' on 7-30-83, ar continued on 7-31-
65								
70				ST-11				PP = 1.75 PP = 2.0
75								
80				ST-12				PP = 3.5 Sample kept in tube for permeability te:
85							87.0	
90				ST-13			Dense blue gray sandy silt	PP = 1.75 PP = 2.25

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915

FIELD ENG./GEO. JP-GDC 530-D APP APPROX. ELEV.

COORDINATES DRILLING METHODS Rotary falling 1500

PAGE 3 OF 3
BORING NO M-2
DATE 7-30-83, 7-31-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
						ml	Dense blue gray sandy silt 95.0	
95						sp	Medium dense fine sand trace of silty clay lenses 100.0	
100				ST-14				
						sp	Medium dense fine sand	
105								
110		18-22-27		S-1				
115							Bottom of boring at 114'	

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915

FIELD ENG./GEO. JR - GDC APPROX. ELEV. 6.3 Ft. MSL

COORDINATES E8211 N2609 DRILLING METHODS Rotary Failing 1500

PAGE 1 OF 3
BORING NO MW-3
DATE 8-4-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
4" PVC	+3' to -116'				

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
							medium stiff tan to gray silty clay, trace of organics	
5				ST-1				PP = 1.0
						ch		
10				ST-2				PP = 1.0
15				ST-3				PP = 7.5 PP = 1.5
							17	
20				ST-4			Very stiff tan and gray silty clay, trace calcareous sand at 20'	PP = 3.25
25				ST-5				PP = 2.75 PP = 3.0
						ch		
30				ST-6				PP = 3.25
35				ST-7				PP = 2.75 PP = 3.25
40				ST-8				PP = 2.75 PP = 3.25

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. JP-CDC S10-BY-APP APPROX. ELEV. 6.3 Ft. MSL
COORDINATES E8211 N2609 DRILLING METHODS Rotary Failing 1500

PAGE 2 OF 3
BORING NO MW-3
DATE 8/4/83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM.	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
50				ST-9			Stiff to very stiff gray to bluish gray silty clay	PP = 3.25 PP = 2.5
55						ch		
60				ST-10				PP = 2.75 PP = 2.25
65								
70				ST-11				PP = 3.5 PP = 2.25
75							75.	
80				ST-12		ml	Very stiff bluish gray clayey silt 83.0	PP = 3.5 PP > 4.5
85						sp	Dense gray fine sand 86.0	
90				ST-13		ml	Dense gray silt 90.0	PP = 3.0

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SWB1-915
FIELD ENG./GEO. JP - GDC / 510 - BD APP APPROX. ELEV.
COORDINATES DRILLING METHODS Rotary Failing 1500

PAGE 3 OF 3
BORING NO MW-3
DATE 8-4-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
95						SP	Dense gray fine sand, trace of silty clay layers interbedded 99.0	
100		12/23/43		S-1				
105						SP	Dense gray fine sand, trace of silty clay layers below 110 feet	
		17/27/28		S-2				
120							Bottom of boring at 116'	

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. HP-GPL 530 D App APPROX. ELEV. 7.9 Ft. MSL
COORDINATES E8029 N3385 DRILLING METHODS Rotary Failing 1500

PAGE 1 OF 3
BORING NO. SW-1
DATE 6-6-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
4" PVC	+ 3'-11"				

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
5				ST-1			Medium stiff to stiff gray and brown silty clay	PP = 1.5
10				ST-2		ch		PP = 1.5
15				ST-3			16.0	PP = 1.5 PP = 2.0
20				ST-4			Stiff to very stiff gray and brown silty clay, trace of gravel size calcareous concretions, from 30' to 40', trace of dry sandy silt lenses at 50'	PP = 2.0 PP = 2.5
25				ST-5				PP = 3.0
30				ST-6		ch		PP = 2.5
35				ST-7				PP = 3.0
40				ST-8				Sample saved in tube for permeability testing.

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. APPROX. ELEV.
COORDINATES DRILLING METHODS Rotary Failing 1500

PAGE 2 OF 3
BORING NO. MW-4
DATE 8-5-81

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S SYMBOL	DESCRIPTION	REMARKS
50				ST-9		ch	Very stiff to stiff gray and brown silty clay, trace of dry sandy silt lenses at 50'	PP = 2.5 PP = 3.0
55								
60				ST-10				Sample sealed in tube for permeability testing
65							65.0'	
70				ST-11		ch	Stiff dark gray silty clay, trace of thin peat layers and oyster shells	PP = 2.0 PP = 2.5
75								
80				ST-12				PP = 2.5
85							87.5'	
90				ST-13		sm-ch	Dense gray silty sand trace of interbedded silty clay layers throughout	PP = 1.25

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME TEXACO PROJECT NUMBER SW81-915
FIELD ENG./GEO. APPROX. ELEV.
COORDINATES DRILLING METHODS Rotary Failing 1500

PAGE 3 OF 3
BORING NO: MW-4
DATE 8-6-83

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

DEPTH	CASING BLOWS PER 30 CM	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	SAMPLE NO. AND TYPE	SOIL PROFILE	U S C S. SYMBOL	DESCRIPTION	REMARKS
95						sm-ch	Dense gray silty sand trace of silty clay layers throughout	
100				ST-14				PP = 1.5 PP = 3.5
105								
110		75/19/18		S-1				
							Bottom of Boring at 111'	

NOTES:

TEST BORING N° IB-1

PROJECT NAME: UPPERMOST AQUIFER EVALUATION
PROJECT N°: 1736
BY: [illegible] DATE: [illegible] CHK'D: [illegible] DATE: [illegible]
GEOLOGIST/ENGINEER: P. SHIMAN
LOCATION: TEXACO REFINERY CONVENT, LA
DRILLING CONTRACTOR: SOIL TESTING ENGINEERS, INC.
DRILLER: [illegible]
DRILL: BUGGY RIG 200
DRILLING METHOD: ROTARY WASH
DRILLING DATE: [illegible]
COORDINATES:
SURFACE ELEVATION: 1.26 FEET MSL
STICK UP ELEVATION:
SCALE 1": [illegible] VERTICAL

LITHOLOGY (SURFACE)	DEPTH, FEET	SAMPLE NO. NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (tsf)
GRAY-BROWN SILTY CLAY (CL) medium stiff to stiff, moist, shell fragments; black organics poorly maturated		1	24	20	2	
GRAY-BROWN SILTY CLAY AND CLAYEY SILT (CL-ML) very stiff, moist		2	24	20	4	2.50
GRAY AND BROWN SILTY CLAY (CL) stiff, moist, brown poorly maturated organics, shell fragments, clayey silt (ML) lenses	5	3	24	20	6	1.50
		4	24	20	8	1.50
GRAY-BROWN CLAY (CH) medium stiff, wet, small brown clayey sand lenses, mottled	10	5	24	20	10	0.75
GRAY AND BROWN SILTY CLAY (CL) soft to medium stiff, wet to saturated, some maturated organics		6	24	20	12	1.25
		7	24	20	14	0.25
GRAY-BROWN CLAY (CH) soft to very stiff, moist to wet, silt seams, some maturated organic, calcareous nodules, mottled, iron staining	15	8	24	20	16	0.75
		9	24	20	18	0.25
	20	10	24	20	20	1.50 to 2.50
BROWN SANDY SILT (ML) stiff, moist to wet, sandy, some clay, some black maturated organics	25	11	24	20	25	1.50
GRAY AND BROWN CLAY (CH) very stiff, moist, some silt, mottled, slickensided, black maturated organics, blocky structures, vertical silt seams	30	12	24	20	30	2.50
red-brown mottling, iron staining	35	13	24	20	35	3.25
	40	14	24	20	40	2.75

STATIC WATER LEVEL (FEET): ▽ (at approx. 4 ft)

UPPERMOST AQUIFER (approx. 9.5 to 27 ft)

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: 1 INCHES = 10 OHMS)

INCREASING RESISTIVITY →

TEST BORING NO. ____

PROJECT NAME ____ PROJECT NO ____ LOCATION ____ DATE ____

GEOLOGIST / ENGINEER ____ DRILLING CONTRACTOR ____ DRILLER ____

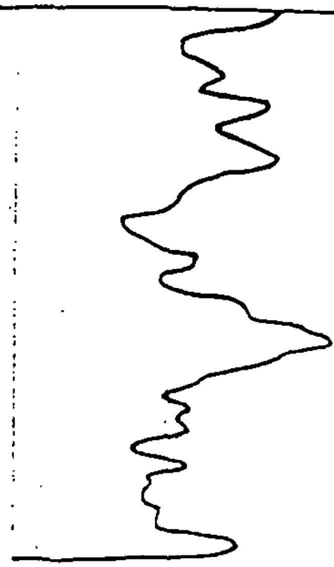
DRILL ____ DRILLING METHOD ____ DRILLING DATE ____ COORDINATES ____

SURFACE ELEVATION ____ STICK UP ELEVATION ____ SCALE 1" = ____ VERTICAL

LITHOLOGY	DEPTH, FEET	SAMPLE NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)
SURFACE						
slickensided		15	24	20	45	2.00
	45					
		16	24	20	50	2.00
	50					
calcareous nodules, sandy, iron staining		17	24	20	55	2.00
	55					
dendritic iron staining		18	24	20	60	3.25
	60					
BORING TERMINATED AT 60.0 FEET						
	65					

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →



* POCKET PENETROMETER READING
** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

TEST BORING Nº TB-2

BY DPM DATE 4-26-83 CHK'D RJM DATE 5-3-83

PROJECT NAME UPPERMOST AQUIFER EVALUATION PROJECT Nº 4954 LOCATION TEXACO REFINERY CONVENT, LA.

GEOLOGIST / ENGINEER P. SHIMAN DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC. DRILLER [illegible]

DRILL BUGGY RIG 220 DRILLING METHOD ROTARY WASH DRILLING DATE 3-26-83 COORDINATES

SURFACE ELEVATION 9.98 FEET MSL STICK UP ELEVATION SCALE 1" = VERTICAL

LITHOLOGY	DEPTH, FEET	SAMPLE NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (tsf)
SURFACE						
BROWN-GRAY SILTY CLAY (CL) soft to hard, moist to saturated, shell fragments, black and brown poorly maturated organics, color changes to gray		1	24	4	2	
		2	24	20	4	1.25
some clayey silt (ML) lenses, iron staining	5	3	24	20	6	4.00
		4	24	20	8	0.75
		5	24	20	10	1.25
black well maturated organics, iron staining	10	6	24	20	12	0.25
		7	24	20	14	1.50
abundant silt, some silt seams	15	8	24	20	16	1.50
		9	24	20	18	2.00
		10	24	20	20	1.25
	20					
		11	24	20	25	3.00
color changes to gray and reddish-brown mottled, some black maturated organics	25					
iron nodules and staining		12	24	20	30	2.50
	30					
		13	24	20	35	4.00
	35					
abundant clayey silt (ML) lenses and vertical seams		14	24	20	40	3.75
GRAY AND REDDISH-BROWN CLAY (CH) very stiff to hard, moist, well maturated black organics	40					

STATIC WATER LEVEL FEET: ▽ (approx. 4 ft)

UPPERMOST AQUIFER (approx. 9 ft to 22 ft)

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →

TEST BORING Nº B-2

BY ____ DATE ____ CHK'D ____ DATE ____

PROJECT NAME ____ PROJECT Nº ____ LOCATION ____

GEOLOGIST / ENGINEER ____ DRILLING CONTRACTOR ____ DRILLER ____

DRILL ____ DRILLING METHOD ____ DRILLING DATE ____ COORDINATES ____

SURFACE ELEVATION ____ STICK UP ELEVATION ____ SCALE 1" = ____ VERTICAL

LITHOLOGY	PROFILE	DEPTH, FEET	SAMPLE ** NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL, FEET
SURFACE								
			15	24	24	45	4.75	
		45						
			16	24	24	50	2.50	
iron nodules, slickensides		50						
			17	24	24	55	2.25	
		55						
			18	24	24	60	2.50	
		60						
BORING TERMINATED AT 60.0 FEET, REAMED OUT TO 63.0 FEET								
		65						

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: 5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →

* POCKET PENETROMETER READING

** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

PROJECT NAME UPPERMOST AQUIFER EVALUATION **TEST BORING Nº** IB-3 BY DPM DATE 4-26-85 CHKD RJM DATE 5-3-85

PROJECT Nº 6956 LOCATION TEXACO REFINERY CONVENT, LA

GEOLOGIST/ENGINEER P. SHIMAN DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC DRILLER [illegible]

DRILL BUGGY RIG 220 DRILLING METHOD ROTARY WASH DRILLING DATE 4-22-85 COORDINATES

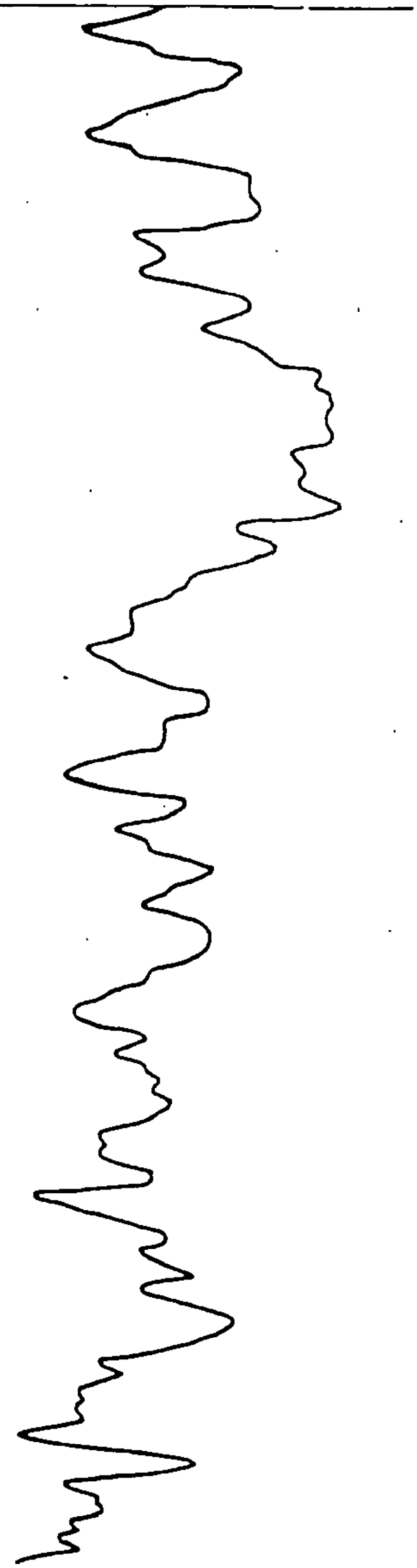
SURFACE ELEVATION 7.48 FEET MSL STICK UP ELEVATION SCALE 1" = VERTICAL

LITHOLOGY	DEPTH, FEET	SAMPLE NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (tsf)
SURFACE						
DARK BROWNISH GRAY CLAY TO SILTY CLAY (CH-CL) stiff, moist, shell fragments, poorly maturated black organics		1	24	15	2	1.25
		2	24	20	4	1.50
	5	3	24	20	6	1.25
GRAY CLAY (CH) medium stiff to very stiff, moist to saturated, some maturated black organics		4	24	20	8	0.75
		5	24	20	10	1.50
	10	6	24	20	12	1.50
some poorly maturated organics		7	24	15	14	0.75
some silt, trace silt lenses; iron staining around organics, iron nodules	15	8	24	24	16	1.00
		9	24	24	18	2.50
		10	24	20	20	3.00
	20					
Color Changes to Gray and Reddish-Brown Mottled slickensides, well maturated black organics		11	24	20	25	2.50
	25					
		12	24	20	30	3.00
Silty Clay to Clayey Silt (CL-ML) lenses and vertical seams	30					
		13	24	20	35	2.25 to 3.00
some silt	35					
abundant maturated black organics, dendritic iron staining		14	24	20	40	3.00 to 3.75
	40					

STATIC WATER LEVEL, FEET: ▽ (near 2 ft); UPPERMOST AQUIFER (approx. 9 to 18 ft)

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY ⟶



TEST BORING No. IB-3

BY ______ DATE ______ CHK'D ______ DATE ______

PROJECT NAME ______ PROJECT No. ______ LOCATION ______

GEOLOGIST / ENGINEER ______ DRILLING CONTRACTOR ______ DRILLER ______

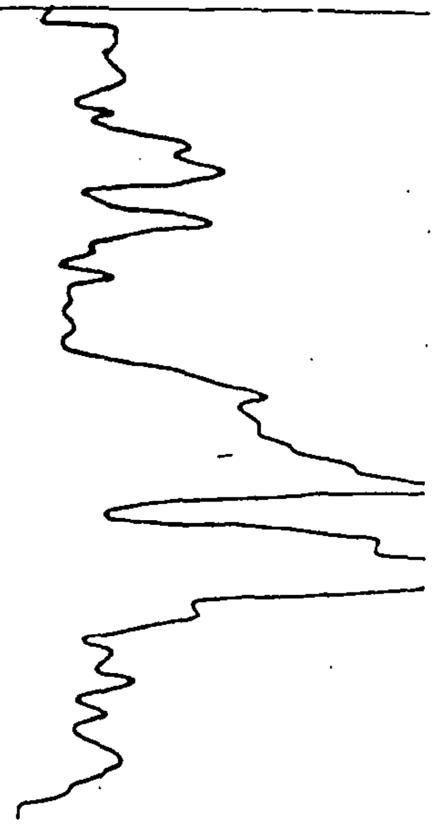
DRILL ______ DRILLING METHOD ______ DRILLING DATE ______ COORDINATES ______

SURFACE ELEVATION ______ STICK UP ELEVATION ______ SCALE 1" = ___ VERTICAL

LITHOLOGY (SURFACE)	PROFILE	DEPTH, FEET	SAMPLE ** NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL, FEET
			13	24	20	45		
		45						
BROWN SILTY SAND (ML) loose, wet, some clay			16	24	20	50	2.25	
		50						
GRAY-BROWN CLAY (CH) very stiff, moist, some silt, some well maturated black organics								
BROWN SILTY SAND (ML) loose, wet, some clay			17	24	20	55	2.75	
		55						
GRAY-BROWN CLAY (CH) very stiff, moist, some silt, dendritic iron staining								
LIGHT GRAY CLAYEY SILT TO SILTY SAND (ML) loose, moist to wet								
GRAY-BROWN CLAY (CH) stiff, moist to wet, some silt lenses, some well maturated black organics			18	24	12	60		
		60						
BORING TERMINATED AT ___ FEET, REAMED OUT TO ___ FEET		65						

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →



* POCKET PENETROMETER READING

** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

TEST BORING Nº IB-A

BY DPM DATE 4-26-85 CHK'D RJM DATE 5-3-85

PROJECT NAME UPPERMOST AQUIFER EVALUATION PROJECT Nº 6956 LOCATION TEXACO REFINERY CONVENT, LA

GEOLOGIST / ENGINEER P. SHIMAN DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC. DRILLER [illegible]

DRILL BUGGY RIG 20C DRILLING METHOD ROTARY WASH DRILLING DATE [illegible] COORDINATES

SURFACE ELEVATION 6.66 FEET MSL STICK UP ELEVATION SCALE 1" = VERTICAL

LITHOLOGY

SURFACE

GRAY-BROWN CLAYEY SAND TO SANDY CLAY (ML-CL)
loose, moist to wet

DARK BROWNISH GRAY CLAY (CH)
very stiff to medium stiff, moist to saturated, some clayey sand lenses, some poorly maturated black organics, iron staining

some shell fragments, trace silt lenses

color changes to light gray

abundant calcareous nodules, abundant silt

some large (1" diameter) calcareous nodules

LIGHT GRAY AND REDDISH-BROWN CLAY TO SILTY CLAY (CH-CL)
stiff to very stiff, moist, abundant large calcareous nodules, trace maturated black organics, iron staining

abundant silt and trace silt lenses

LIGHT GRAY AND REDDISH-BROWN CLAY (CH)
stiff to very stiff, moist to wet, slickensided, some well maturated black organics

NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (tsf)
1	24	12	2	
2	24	12	4	2.00
3	24	18	6	1.00
4	24	20	8	1.25
5	24	20	10	
6	24	20	12	
7	24	20	14	2.25
8	24	20	16	1.50
9	24	18	18	1.75 to 2.25
10	24	17	20	2.00
11	24	20	25	1.50
12	24	20	30	2.25
13	24	24	35	2.50
14	24	20	40	2.00

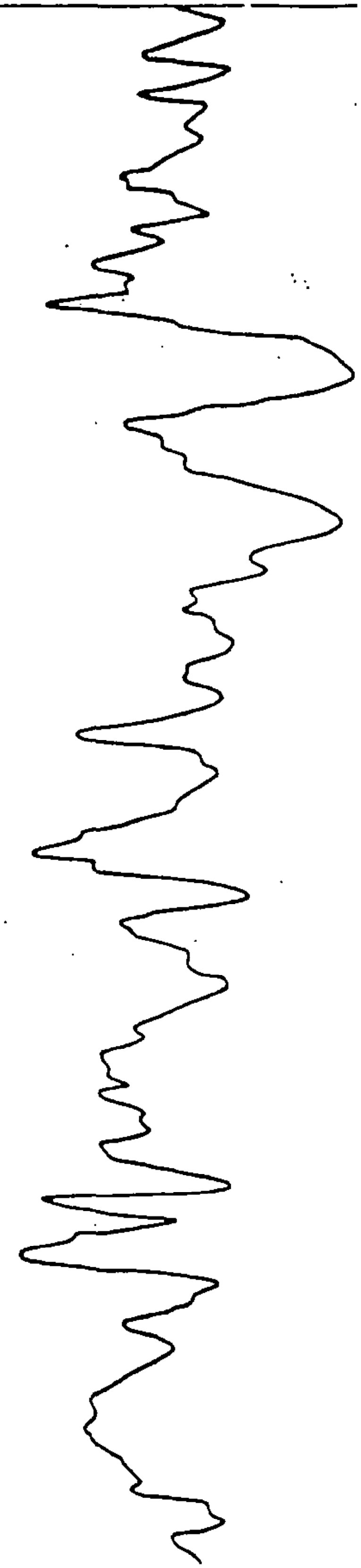
DEPTH, FEET: 5, 10, 15, 20, 25, 30, 35, 40

STATIC WATER LEVEL (FEET): ▽

UPPERMOST AQUIFER

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →



TEST BORING Nº IB-4

BY ______ DATE ______ CHK'D ______ DATE ______

PROJECT NAME ______ PROJECT Nº ______ LOCATION ______
GEOLOGIST / ENGINEER ______ DRILLING CONTRACTOR ______ DRILLER ______
DRILL ______ DRILLING METHOD ______ DRILLING DATE ______ COORDINATES ______
SURFACE ELEVATION ______ STICK UP ELEVATION ______ SCALE 1" = ___ VERTICAL

LITHOLOGY	PROFILE	DEPTH, FEET	SAMPLE ** NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL FEET
SURFACE								
			15	24	20	45		
some silty sand (ML) lenses and vertical seams, some maturated black organics; abundant iron staining		45						
			16	24	20	50	2.25	
slickensides; calcareous nodules, some well maturated black organics		50						
			17	24	20	55	2.25	
		55						
trace silt			18	24	20	60	1.75 to 2.00	
		60						
BORING TERMINATED AT 60.0 FEET, REAMED TO 65.0 FEET								
		65						

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: 1 INCHES = 10 OHMS)

INCREASING RESISTIVITY →

* POCKET PENETROMETER READING
** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

TEST BORING Nº B-5

PROJECT NAME UPPERMOST AQUIFER EVALUATION PROJECT Nº [illegible] BY DPM DATE 4-26-85 CHK'D RJM DATE 5-2-85
LOCATION TEXACO REFINERY CONVENT, LA
GEOLOGIST / ENGINEER P. SHIMAN DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC DRILLER [illegible]
DRILL BUGGY RIG 200 DRILLING METHOD ROTARY WASH DRILLING DATE [illegible] COORDINATES
SURFACE ELEVATION 7.[illegible] FEET MSL STICK UP ELEVATION SCALE 1"= ___ VERTICAL

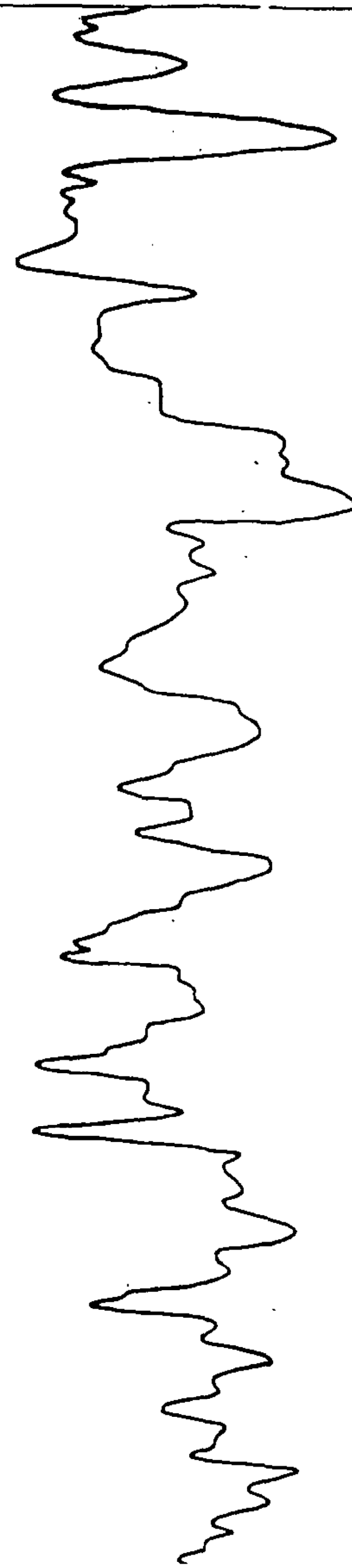
BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY ⟶

SURFACE

Lithology	Depth, feet	Sample Number	Penetration (inches)	Recovery (inches)	Depth, feet	Unconfined Compressive Strength (tsf)	Static Water Level, feet
GRAY-BROWN CLAY (CH) stiff to very stiff, moist to saturated, some roots and shells; iron staining		1	24	20	2	1.00	
		2	24	20	4	1.50	
some silt	5	3	24	20	6	1.75	
		4	24	20	8	1.25	
color changes to light gray, trace woody organics		5	24	20	10	1.25	
	10	6	24	20	12	2.00	
		7	24	20	14	1.75	
	15	8	24	20	16	1.00 to 2.75	
LIGHT GRAY AND REDDISH BROWN CLAY TO SILTY CLAY (CH-CL) medium stiff to very stiff, moist to wet, abundant calcareous nodules, some well maturated black organics, some iron staining, abundant silt		9	24	20	18	0.75	
		10	24	20	20	1.50 to 3.25	
	20						
LIGHT GRAY AND REDDISH BROWN CLAY (CH) stiff to very stiff, moist, abundant calcareous nodules and well maturated black organics		11	24	20	25	1.25	
	25						
		12	24	20	30	2.25 to 3.25	
iron staining	30						
		13	24	20	35	2.25 to 3.00	
	35						
CLAYEY AND SILTY SAND (ML) loose, moist to wet		14	24	20	40		
	40						

UPPERMOST AQUIFER



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TEST BORING Nº IB-5

PROJECT NAME ______ PROJECT Nº ______ LOCATION ______

GEOLOGIST / ENGINEER ______ DRILLING CONTRACTOR ______ DRILLER ______

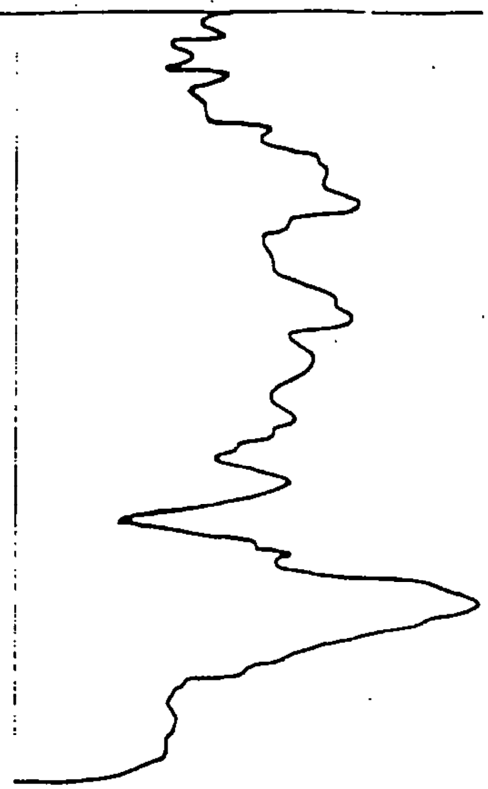
DRILL ______ DRILLING METHOD ______ DRILLING DATE ______ COORDINATES ______

SURFACE ELEVATION ______ STICK UP ELEVATION ______ SCALE 1" = ______ VERTICAL

LITHOLOGY	PROFILE	DEPTH, FEET	SAMPLE ** NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL, FEET
SURFACE								
BROWNISH GRAY CLAY (CH) very stiff, moist, abundant well maturated black organics, slickensides, some iron staining		45	15	24	20	45	2.50	
BROWN CLAYEY SILT (ML) medium dense, wet, abundant sand		50	16	24	20	50		
BROWNISH GRAY SILTY CLAY TO CLAYEY SILT (CL-ML) very stiff, moist, some calcareous nodules and well maturated organics, iron staining		55	17	24	20	55	2.50	
BROWNISH GRAY CLAYEY SILT AND SILTY SAND (ML) medium dense, moist to wet, abundant very fine-grained sand		60	18	24	20	60		
BORING TERMINATED AT [illegible] FEET, REAMED OUT TO [illegible] FEET		65						

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →



* POCKET PENETROMETER READING

** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

TEST BORING Nº TB-6

BY DPM DATE 4-26-85 CHK'D BY RJM DATE 5-3-85

PROJECT NAME UPPERMOST AQUIFER EVALUATION PROJECT # 6956 LOCATION TEXACO REFINERY CONVENT, LA

GEOLOGIST/ENGINEER P. SHIMAN DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC. DRILLER [illegible]

DRILL BUGGY RIG 200 DRILLING METHOD ROTARY WASH DRILLING DATE [illegible] COORDINATES

SURFACE ELEVATION 7.76 FEET MSL STICK UP ELEVATION SCALE 1" = VERTICAL

Lithology	Depth, feet	Sample Number	Penetration (inches)	Recovery (inches)	Depth, feet	Unconfined Compressive Strength (tsf)	Static Water Level, feet
SURFACE							
DARK BROWNISH GRAY CLAY (CH) medium stiff to stiff, moist to wet, abundant poorly maturated black organics, abundant shell fragments, some silt, color changes to gray, iron staining, some poorly maturated, woody organics		1	24	12	2		
		2	24	8	4	1.75	
	5	3	24	16	6	1.00 to 1.25	▽
		4	24	8	8		
some silt		5	24	15	10	0.75	
	10	6	24	20	12	1.25	
LIGHT GRAY AND YELLOWISH BROWN CLAYEY SILT (ML) stiff to very stiff, saturated, trace black organics		7	24	15	14	2.75	UPPERMOST AQUIFER
	15	8	24	21	16		
LIGHT GRAY AND REDDISH BROWN CLAY (CH) very stiff, moist to wet, mottled, some calcareous nodules, some silt		9	24	20	18	1.50 to 2.50	
		10	24	20	20	2.00 to 2.25	
	20						
slickensides, blocky structure		11	24	20	25	2.50	
	25						
		12	24	20	30	2.75	
	30						
LIGHT GRAY AND REDDISH BROWN CLAY AND SILTY CLAY (CH-CL) very stiff, moist to wet, some vertical silt seams and lenses		13	24	20	35	2.75	
	35						
GRAY SILTY CLAY (CL) very stiff, moist		14	24	20	40	2.50 to 3.50	
	40						

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →

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TEST BORING Nº IB-[illegible]

BY ______ DATE ______ CHKD ______ DATE ______

PROJECT NAME ______ PROJECT Nº ______ LOCATION ______

GEOLOGIST / ENGINEER ______ DRILLING CONTRACTOR ______ DRILLER ______

DRILL ______ DRILLING METHOD ______ DRILLING DATE ______ COORDINATES ______

SURFACE ELEVATION ______ STICK UP ELEVATION ______ SCALE ______ VERTICAL

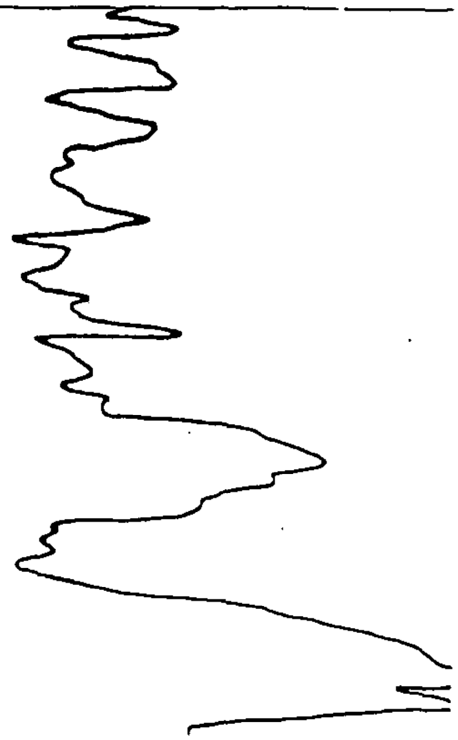
LITHOLOGY (SURFACE)	DEPTH, FEET	SAMPLE NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH (FEET)	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL (FEET)
BROWN CLAYEY SILT AND CLAY (ML-CH) loose, dry to moist, some vertical silt seams, some very fine-grained sand	45	15	24	20	43		
GRAY AND REDDISH BROWN CLAY (CH) very stiff, moist, slickensided, iron staining	50	16	24	20	50	2.25	
GRAYISH BROWN AND REDDISH BROWN CLAY TO SILTY CLAY (CH-CL) very stiff, moist, trace calcareous nodules	55	17	24	24	55	2.50 to 2.75	
GRAYISH BROWN AND REDDISH BROWN CLAY (CH) very stiff, moist, trace calcareous nodules	60	18	24	20	60	2.25	

BORING TERMINATED AT 60.0 FEET, REAMED OUT TO 61.0 FEET

65

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →



* POCKET PENETROMETER READING

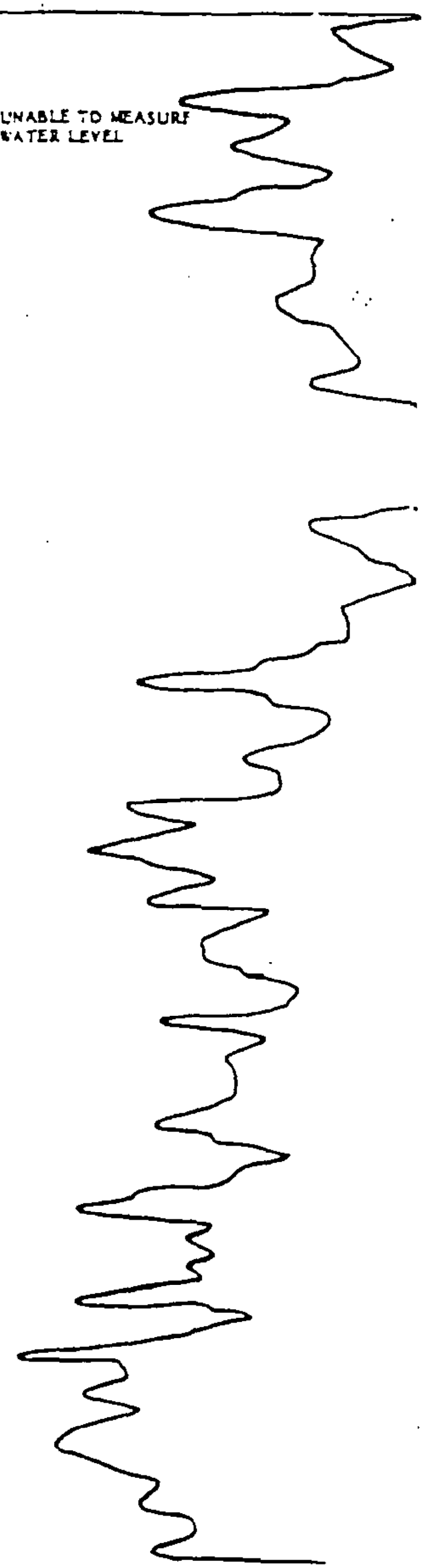
** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

TEST BORING Nº TB-7

PROJECT NAME: UPPERMOST AQUIFER EVALUATION PROJECT Nº: [illegible] BY: DPM DATE: [illegible]-26-85 CHECKED: RJM DATE: [illegible]
LOCATION: TEXACO REFINERY CONVENT, LA
GEOLOGIST / ENGINEER: P. SHIMAN DRILLING CONTRACTOR: SOIL TESTING ENGINEERS, INC. DRILLER: [illegible]
DRILL: BUGGY RIG 200 DRILLING METHOD: ROTARY WASH DRILLING DATE: [illegible] COORDINATES:
SURFACE ELEVATION: 2.97 FEET MSL STICK UP ELEVATION: SCALE 1" = ___ VERTICAL

LITHOLOGY (SURFACE)	DEPTH, FEET	SAMPLE NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (TSF)	STATIC WATER LEVEL FEET
BROWNISH-GRAY SANDY CLAY TO CLAYEY SAND FILL (CL-SM) medium stiff, moist to wet, abundant shell fragments		1	24	20	2		
		2	24	20	4		UNABLE TO MEASURE WATER LEVEL
BROWN SAND FILL (SP-SM) loose, saturated, some clay	5	3	24	20	6		
GRAY AND REDDISH BROWN CLAY (CH) stiff, moist to wet, trace silt, mottled		4	24	20	8		UPPERMOST AQUIFER
		5	24	20	10	1.25	
GRAY AND REDDISH BROWN CLAY AND SILTY CLAY (CH-CL) soft to very stiff, moist to saturated, abundant vertical seams of silty clay and clayey silt, trace silt lenses, mottled	10	6	24	20	12		
		7	24	20	14	1.00	
	15	8	24	20	16	1.75	
		9	24	20	18	0.75 to 1.00	
		10	24	20	20	1.00	
	20						
seams of calcareous deposits, some silt		11	24	20	23	2.50 to 3.00	
	25						
some iron nodules, some macerated organics		12	24	20	30	3.25 to 3.50	
	30						
GRAY AND REDDISH BROWN CLAY (CH) very stiff, moist, mottled, slickensided, dendritic iron staining, trace silty sand		13	24	20	35	2.75	
	35						
		14	24	20	40	2.25	
	40						

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)
INCREASING RESISTIVITY →



TEST BORING No B-7

BY ______ DATE ______ CHKD ______ DATE ______

PROJECT NAME ______ PROJECT NO ______ LOCATION ______

GEOLOGIST / ENGINEER ______ DRILLING CONTRACTOR ______ DRILLER ______

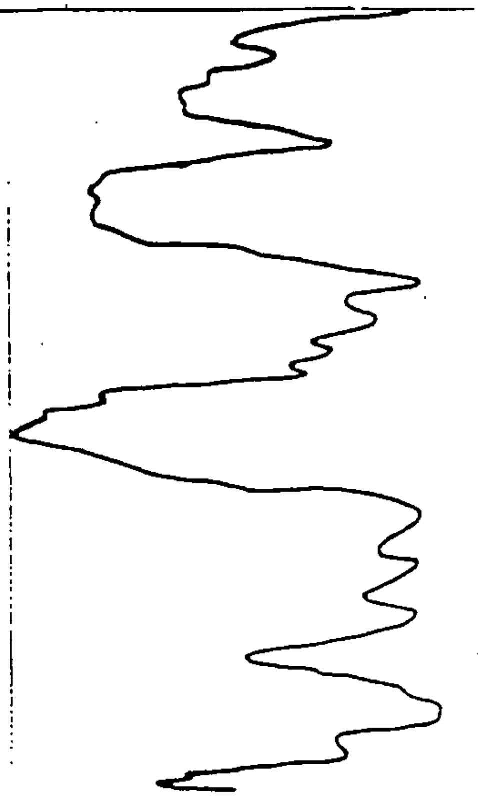
DRILL ______ DRILLING METHOD ______ DRILLING DATE ______ COORDINATES ______

SURFACE ELEVATION ______ STICK UP ELEVATION ______ SCALE 1" = ___ VERTICAL

LITHOLOGY	PROFILE	DEPTH, FEET	SAMPLE ** NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL, FEET
SURFACE								
LIGHT GRAY TO BROWN SILTY CLAY (CL) very stiff to hard, moist, some silt, dentritic iron staining mottled			15	24	24	45	3.25 to 4.00	
		45						
LIGHT GRAY TO BROWN CLAY (CH) very stiff, moist, slickensided, iron staining, some maturated black organics			16	24	24	50	2.25 to 2.50	
		50						
color changes to gray, some silt			17	24	24	55	2.00	
		55						
GRAY CLAY TO CLAYEY SILT (CH-ML) very stiff, moist, abundant vertical silt seams and lenses, some sand			18	24	24	60	2.50	
		60						
BOREHOLE TERMINATED AT 60.0 FEET, REAMED TO 65.0 FEET								
		65						

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY →



* POCKET PENETROMETER READING
** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

PROJECT NAME UPPERMOST AQUIFER EVALUATION PROJECT Nº 6954

TEST BORING Nº IB-8

BY DPM DATE 4-26-83 CHKD RJM DATE 5-3-83

LOCATION TEXACO REFINERY CONVENT, LA

GEOLOGIST / ENGINEER P. SHIMAN DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC. DRILLER D. [illegible]

DRILL BUGGY RIG 200 DRILLING METHOD ROTARY WASH DRILLING DATE 2-26-83 COORDINATES

SURFACE ELEVATION 8.2± FEET MSL STICK UP ELEVATION SCALE 1" = VERTICAL

LITHOLOGY	SAMPLE NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (tsf)
GRAY-BROWN SILTY CLAY (CL) stiff, moist to wet, some shell fragments	1	24	4	2	
	2	24	8	4	
GRAY-BROWN CLAY (CH) stiff, moist to wet, some shell fragments	3	24	16	6	1.00 to 1.25
	4	24	20	8	1.25
	5	24	20	10	
some calcareous fragments, some silt	6	24	20	12	1.00 to 1.50
BROWN AND GRAY CLAYEY SILT (ML) very loose, saturated	7	24	20	14	
	8	24	20	16	
BROWN AND GRAY CLAY (CH) stiff, moist, some silt, some iron nodules, some maturated black organics, mottled	9	24	20	18	
	10	24	20	20	1.50 to 2.00
BROWN AND GRAY SILTY CLAY TO CLAY (CH-CL) stiff, moist, some iron nodules, some maturated black organics, mottled	11	24	20	23	2.00
BROWN AND GRAY CLAY (CH) stiff to very stiff, moist, poorly maturated black organics (roots), mottled	12	24	20	30	2.50 to 3.25
slickensided, some calcareous nodules, some maturated black organics	13	24	20	35	2.00 to 2.75
	14	24	20	40	2.25 to 2.50

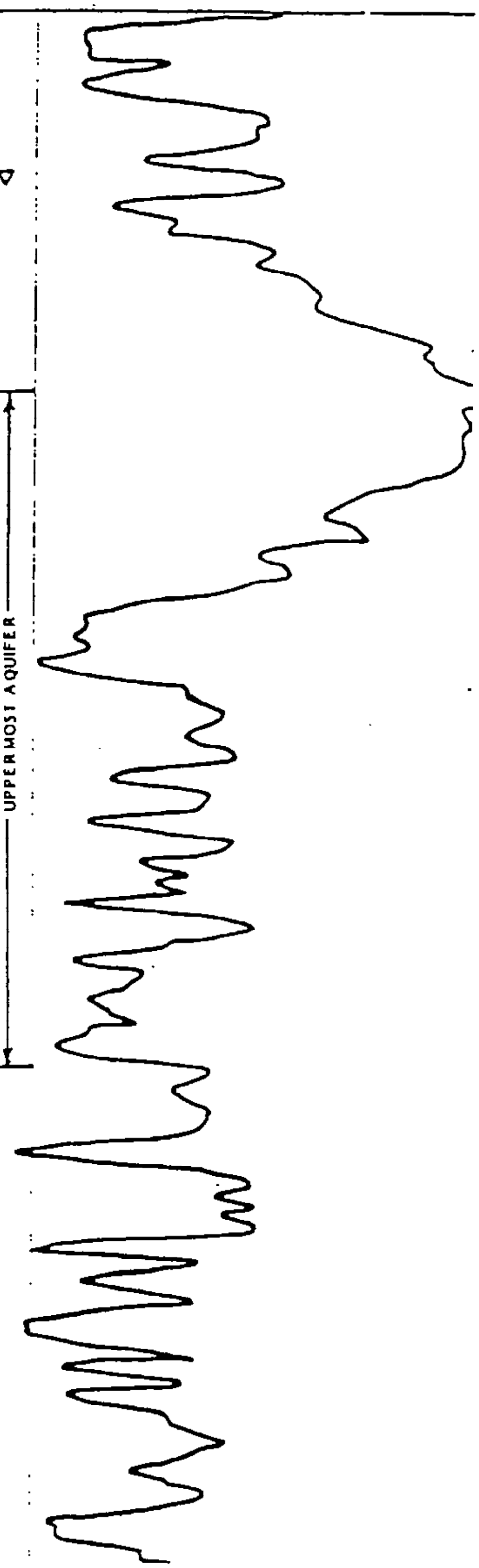
DEPTH, FEET: 5, 10, 15, 20, 25, 30, 35, 40

STATIC WATER LEVEL (FEET): ▽

UPPERMOST AQUIFER

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY ⟶



TEST BORING Nº B-2

BY ____ DATE ____ CHKD ____ DATE ____

PROJECT NAME ____ PROJECT Nº ____ LOCATION ____

GEOLOGIST / ENGINEER ____ DRILLING CONTRACTOR ____ DRILLER ____

DRILL ____ DRILLING METHOD ____ DRILLING DATE ____ COORDINATES ____

SURFACE ELEVATION ____ STICK UP ELEVATION ____ SCALE 1" = ____ VERTICAL

LITHOLOGY | PROFILE | DEPTH, FEET | SAMPLE ** (NUMBER, PENETRATION (INCHES), RECOVERY (INCHES)) | UNCONFINED COMPRESSIVE STRENGTH* (tsf) | STATIC WATER LEVEL (FEET)

SURFACE

BROWN AND GRAY SILTY CLAY AND CLAY (CH-CL)
stiff, moist, trace silty sand

GRAY AND REDDISH BROWN CLAY (CH)
stiff, moist, abundant vertical silty sand seams, some iron staining, slickensided, blocky structure

trace calcareous nodules

BROWN AND GRAY CLAY TO BROWN CLAYEY SILT (CH-ML)
loose, moist to wet, trace calcareous nodules, iron nodules, mottled, abundant vertical silt seams

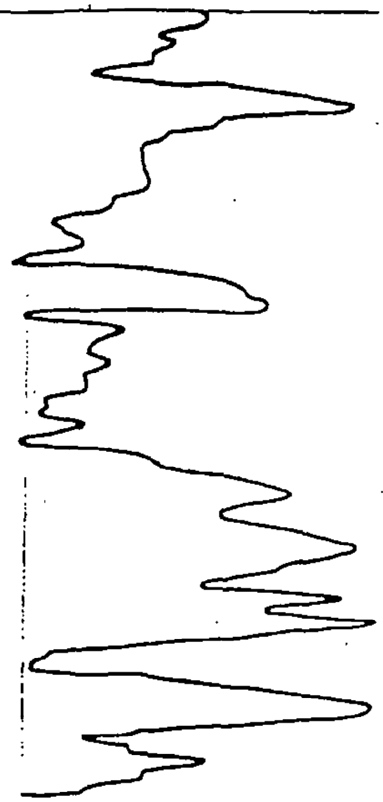
BORING TERMINATED AT 60.0 FEET, REAMED OUT TO 63.0 FEET

Number	Penetration (inches)	Recovery (inches)	[illegible]	Unconfined Compressive Strength* (tsf)
13	24	20	45	2.75
16	24	20	50	2.00 to 2.50
17	24	24	53	2.50
18	24	20	60	

Depth marks: 45, 50, 55, 60, 65

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS.

INCREASING RESISTIVITY →



* POCKET PENETROMETER READING
** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

TEST BORING Nº IB-9

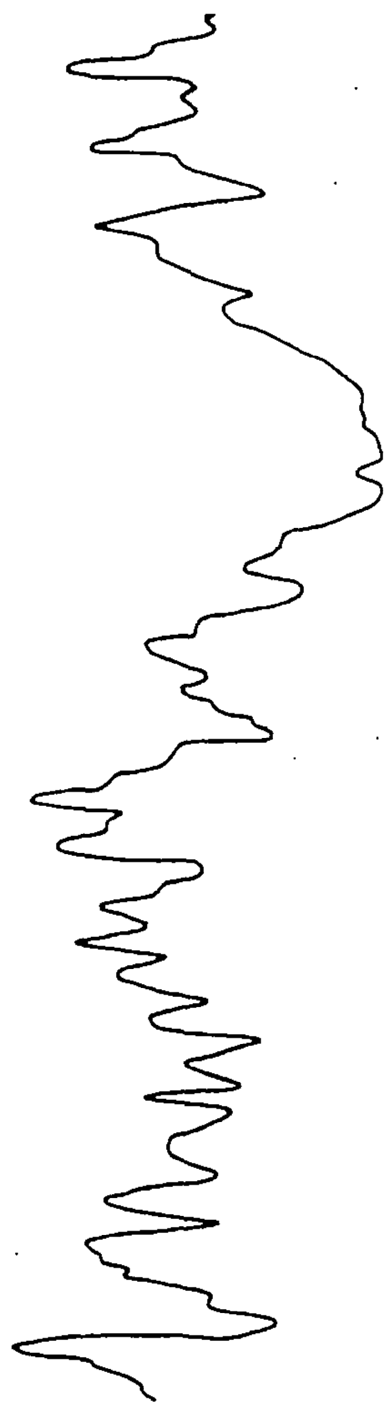
PROJECT NAME UPPERMOST AQUIFER EVALUATION PROJECT Nº 1950 BY DPM DATE 5-26-85 CHK'D BY SMH DATE 5-2-85
GEOLOGIST / ENGINEER P. SHIMAN LOCATION TEXACO REFINERY CONVENT, LA
DRILL BUGGY RIG 200 DRILLING METHOD ROTARY WASH DRILLING CONTRACTOR SOIL TESTING ENGINEERS, INC. DRILLER
DRILLING DATE 1-22-85 COORDINATES
SURFACE ELEVATION 12.58 FEET MSL STICK UP ELEVATION SCALE 1" = VERTICAL

LITHOLOGY	DEPTH, FEET	SAMPLE NO. NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH (tsf)	STATIC WATER LEVEL, FEET
SURFACE							
GRAY-BROWN CLAY TO SILTY CLAY (CH-CL) medium stiff, moist, abundant poorly maturated roots, some shell fragments		1	24	20	2		
		2	24	20	4		
GRAY-BROWN CLAY (CH) soft to stiff, moist to saturated, some shell fragments, some poorly maturated wood	5	3	24	20	6	0.75	
		4	24	20	8		
iron staining		5	24	20	10	1.25 to 1.50	▽
	10	6	24	20	12	1.25	
color changes to gray and brown, iron nodules, some poorly maturated black organics, trace silt lenses		7	24	20	14	1.00	
	15	8	24	20	16		
		9	24	20	18	1.00	
GRAY AND REDDISH BROWN SILTY CLAY (CL) soft to very stiff, moist to saturated, clay seams, silt lenses and vertical seams, abundant silt		10	24	20	20		
	20	11	24	20	22	0.25 to 0.75	
		12	24	24	24	1.00	
	25	13	24	20	26	2.50	
some silty lenses, abundant iron nodules, some maturated black organics		14	24	20	30	2.25	
	30						
LIGHT GRAY TO REDDISH BROWN CLAY AND SILTY CLAY (CH-CL) stiff, moist to wet, trace silt lenses, slickensided		15	24	20	35		
	35						
LIGHT GRAY CLAY (CH) very stiff, moist, iron nodules and staining, abundant maturated roots with granular material surrounding them		16	24	20	40	3.50	
	40						

UPPERMOST AQUIFER

BOREHOLE POINT RESISTIVITY LOG (HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY ⟶



BEST COPY

TEST BORING Nº B-5

BY ______ DATE ______ CHK'D ______ DATE ______

PROJECT NAME ______ PROJECT Nº ______ LOCATION ______

GEOLOGIST / ENGINEER ______ DRILLING CONTRACTOR ______ DRILLER ______

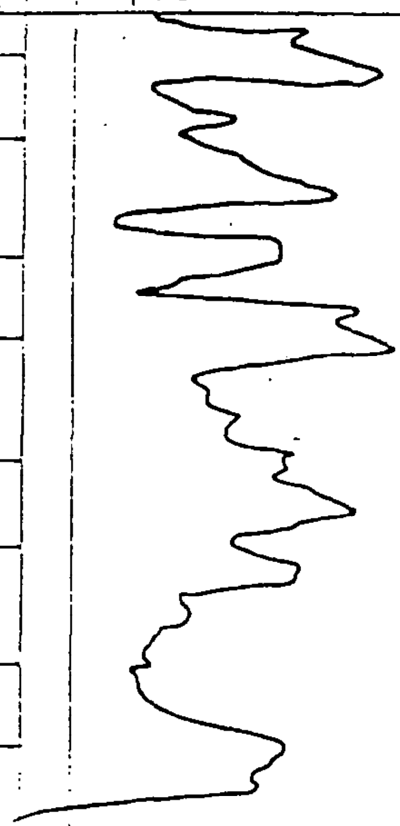
DRILL ______ DRILLING METHOD ______ DRILLING DATE ______ COORDINATES ______

SURFACE ELEVATION ______ STICK UP ELEVATION ______ SCALE 1" = ___' VERTICAL

LITHOLOGY	PROFILE	DEPTH, FEET	SAMPLE ** NUMBER	PENETRATION (INCHES)	RECOVERY (INCHES)	DEPTH, FEET	UNCONFINED COMPRESSIVE STRENGTH* (tsf)	STATIC WATER LEVEL FEET
SURFACE								
			17	24	20	45	3.00	
		45						
GRAY CLAY TO BROWN SILT (CH-ML) loose, moist to wet, abundant iron nodules, abundant maturated black organics			18	24	20	50		
		50						
			19	24	20	55	2.50	
dendritic iron staining some silt lenses		55						
iron nodules			20	24	20	60	2.50	
		60						
BORING TERMINATED AT 60.0 FEET, REAMED OUT TO 65.0 FEET								
		65						

BOREHOLE POINT RESISTIVITY LOG
(HORIZONTAL SCALE: .5 INCHES = 10 OHMS)

INCREASING RESISTIVITY ⟶



* POCKET PENETROMETER READING

** ALL SAMPLES RETRIEVED WITH SHELBY TUBES

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA
CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB- 1
Sheet 1 of 1

FILE: 90-056
DATE: 4-24-90
TECH.: E. Paille
DRILLER: G. Matthews

FIELD DATA

BORING ADVANCE METHOD
Auger: 0' - 6'
Wash: 6' - Bottom
RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Ground Water Level	Depth (feet)	Sample	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
				Firm brown & tan Slightly Clayey Silt w/layers
▽ (3'4")			1.5 (P)	Medium brown & tan Silty Clay
▽	5		1.75 (P)	w/ferrous nodules, organics, & silt pockets
			2.0 (P)	becoming slightly silty
	10		2.5 (P)	
			2.5 (P)	w/small silt pockets & ferrous nodules
			2.25 (P)	
	15		2.0 (P)	w/more silt
			1.6 (P)	
			1.75 9P)	
	20		1.75 (P)	w/small silt pockets
			3.0 (P)	w/calcareous nodules
	25			Bottom at 24'

SYMBOL

Standard Penetration Test 140 lb Hammer - 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

▽ Free Water First Encountered

Water Level After 15 mins. at 3'4" (Prior To Wash Boring)

▼ Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI, Convent, LA

CLIENT: C-K Associates, Baton Rouge, LA

Boring No. RFB-3

Sheet 1 of 1

FILE: 90-056

DATE: 5-1-90

TECH.: E. Paille

DRILLER: G. Matthews

BORING ADVANCE METHOD

Auger: 0' - 20'

Wash:

RIG: 1500 F.

METHOD OF BACKFILLING: Grout

Depth (feet)	Standard Penetration Test (blows/foot) or Penetrometer (P) (tons/sq ft)	Description
0–4		Loose tan Silty Sand & shell
5 (water symbol)	1.5 (P)	Medium dark gray & tan Silty Clay w/shell
	1.5 9P)	
	2.0 (P)	becoming tan & light gray w/ferrous nodules
10	1.75 (P)	w/organics
	1.5 (P)	
15	1.5 (P)	
	1.25 (P)	
	1.0 (P)	w/1/16" silt seams 2" apart
20		Bottom at 20'

SYMBOL

Standard Penetration Test 140 lb Hammer - 30" Fall

Free Water First Encountered

NOTE: Visual Classifications Only

Undisturbed Sample 3 inch dia Shelby Tube

Water Level After 30 mins. at 6'1" (Prior To Wash Boring)

No Recovery

Water Level After

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA
CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB-5
Sheet 1 of 1

FILE: 90-056
DATE: 4-30-90
TECH.: E. Paille
DRILLER: G. Matthews

BORING ADVANCE METHOD
Auger: 0' - 18'
Wash:
RIG: 1500 F.
METHOD OF BACKFILLING: Grout

FIELD DATA: Water Level	Depth (feet)	Sample	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
				2" of Asphalt
				Loose tan Silty Sand & shell
	5			
▽			4.25 (P)	Very stiff brown & dark gray Slightly Silty Clay
			3.5 (P)	w/ferrous nodules
	10		3.25 (P)	
			3.5 (P)	w/small silt pockets
	15		3.75 (P)	
▽			3.75 (P)	w/ferrous & calcareous nodules
				Bottom at 18'
	20			

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

▽ Free Water First Encountered

Water Level After 30 mins. at 8'1" (Prior To Wash Boring)

▼ Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA
CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB- 7
Sheet 1 of 1

FILE: 90-056
DATE: 4-30-90
TECH.: E. Paille
DRILLER: G. Matthews

FIELD DATA

BORING ADVANCE METHOD
Auger: 0' - 22'
Wash:

RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Depth (feet)	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
		Loose Silty Sand & shell
5	2.25 (P)	Stiff dark gray & brown Silty Clay w/shell & sand
	2.5 (P)	w/shell
10	3.0 (P)	Tan & brown Slightly Silty Clay w/organics & ferrous nodules
	2.75 (P)	Stiff tan & light gray Silty Clay w/small silt pockets
	2.75 (P)	w/ferrous nodules
15	1.5 (P)	
	1.25 (P)	
20	1.25 (P)	w/small silt pockets
	2.5 (P)	becoming slightly silty w/calcareous nodules
		Bottom at 22'
25		

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

Free Water First Encountered

Water Level After 30 mins. at 9' (Prior To Wash Boring)

Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

STEI 4

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA

CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB-8
Sheet 1 of 1

FILE: 90-056
DATE: 4-27-90
TECH.: E. Paille
DRILLER: C. Matthews

BORING ADVANCE METHOD
Auger: 0' - 22'
Wash:

RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Symbol	Depth (feet)	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
	0–5		Loose Silty Sand & shell
		4.0 (P)	Very stiff dark gray Silty Clay
▽ (11'4")	10	3.0 (P)	
		2.8 (P)	w/ferrous nodules
		1.75 (P)	becoming tan & light gray
	15	1.5 (P)	
▽		1.0 (P)	becoming wet
		1.95 (P)	w/calcareous nodules
	20	2.75 (P)	
	25		Bottom at 22'

SYMBOL

- Standard Penetration Test 140 lb Hammer 30" Fall
- Undisturbed Sample 3 inch dia Shelby Tube
- No Recovery
- Free Water First Encountered
- Water Level After 15 mins. at 11'4" (Prior To Wash Boring)
- Water Level After

NOTE: Visual Classifications Only

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise
Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA
CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB- 9
Sheet 1 of 1

FILE: 90-056
DATE: 4-26-90
TECH.: E. Paille
DRILLER: G. Matthews

FIELD DATA

BORING ADVANCE METHOD
Auger: 0' - 22'
Wash:
RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Water Level	Depth (Feet)	Sample	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
	0–5			3 1/2" of shells then loose Sand & shells
			3.0 (P)	Stiff dark gray & tan Silty Clay w/ferrous nodules
			3.1 (P)	
∇	10		2.5 (P)	becoming tan & light gray w/ferrous nodules & silt pockets
			1.5 (P)	w/o silt pockets
	15		1.1 (P)	
∇			1.0 (P)	becoming wet
	20		2.75 (P)	w/calcareous nodules
				Bottom at 22'
	25			

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

∇ Free Water First Encountered

∇ Water Level After 20 mins. at 10'1" (Prior To Wash Boring)

▼ Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

PROJECT: Star Enterprises RFI
Convent, LA

CLIENT: C-K Associates
Baton Rouge, LA

SOIL BORING LOG

Boring No. RFB-10
Sheet 1 of 1

FILE: 90-056
DATE: 4-25-90
TECH.: E. Paille
DRILLER: G. Matthews

RIG: 1500 F.

BORING ADVANCE METHOD
Auger: 0' - 10'
Wash: 10' - Bottom

METHOD OF BACKFILLING: Grout

FIELD DATA

Depth (Feet)	Standard Penetration Test (blows/foot) — Penetrometer (P) (tons/sq ft)	Description
	Auger Sample	6" shell then stiff dark gray Silty Clay & shell
	4.5 (P)	
5	4.0 (P)	
	4.25 (P)	
	3.25 (P)	Stiff brown & dark gray Silty Clay
10	3.75 (P)	
	3.0 (P)	w/small silt pockets
15	2.0 (P)	Medium brown, tan & light gray Silty Clay
	1.1 (P)	w/ferrous nodules
	1.25 (P)	becoming tan & light gray
20	2.75 (P)	w/calcareous nodules
		Bottom at 22'
25		

SYMBOL

Standard Penetration Test 140 lb Hammer · 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Free Water First Encountered

Water Level After 20 mins. at 8'1" (Prior To Wash Boring)

Water Level After

NOTE: Visual Classifications Only

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise
Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI, Convent, LA
CLIENT: C-K Associates, Baton Rouge, LA

Boring No. RFB-11
Sheet 1 of 1

FILE: 90-056
DATE: 4-25-90
TECH.: E. Paille
DRILLER: G. Matthews

BORING ADVANCE METHOD
Auger: 0' - 6'
Wash: 6' - Bottom
RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Symbol	Depth (feet)	Standard Penetration Test (blows/foot) or Penetrometer (P) (tons/sq ft)	Description
		Auger Sample	6" shell & limestone then Hard brown & dark gray Silty Clay w/shell
		4.5 (P)	
* ▽	5	4.25 (P)	
		4.25 (P)	
	10	3.8 (P)	Very stiff dark gray Silty Clay w/1/8" medium sand layer & shell
		3.0 (P)	Stiff dark gray Silty Clay
		2.8 (P)	
	15	1.25 (P)	Medium tan & light gray Silty Clay w/large clayey silt pockets
		1.5 (P)	w/less silt below 19'
			Bottom at 18'
	20		

SYMBOL
- Standard Penetration Test 140 lb Hammer 30" Fall
- Undisturbed Sample 3 inch dia Shelby Tube
- No Recovery
- Free Water First Encountered
- Water Level After (Prior To Wash Boring)
- Water Level After

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise
Strata Boundaries May Not Be Exact

NOTE: Visual Classifications Only

*: Boring caved in at 5.5'

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA

CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB- 12
Sheet 1 of 1

FILE: 90-056
DATE: 4-26-90
TECH.: E. Paille
DRILLER: G. Matthews

BORING ADVANCE METHOD
Auger: 0' - 20'
Wash:

RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Water Level	Depth (feet)	Sample	Standard Penetration Test (blows/feet) / Penetrometer (P) (tons/sq ft)	Description
			Auger Sample	Stiff brown & dark gray Silty Clay w/3" shell at top
			4.5 (P)	becoming very stiff slightly silty w/very small silt pockets
	5		4.1 (P)	w/shell traces
			3.0 (P)	Stiff tan & gray Silty Clay w/ferrous nodules
			2.1 (P)	w/small silt pockets
▽	10		2.0 (P)	
			1.75 (P)	becoming medium
	15		1.25 (P)	
▽			1.25 (P)	
			3.25 (P)	Stiff tan & light gray Slightly Silty Clay w/calcareous nodules
	20			Bottom at 20'

SYMBOL

Standard Penetration Test 140 lb Hammer - 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

▽ Free Water First Encountered

▽ Water Level After 30 mins. at 11'4" (Prior To Wash Boring)

▼ Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

PROJECT: Star Enterprises RFI
Convent, LA

SOIL BORING LOG

Boring No. RFB-13
Sheet 1 of 1

CLIENT: C-K Associates
Baton Rouge, LA

FILE: 90-056
DATE: 4-26-90
TECH.: E. Paille
DRILLER: G. Matthews

FIELD DATA

BORING ADVANCE METHOD
Auger: 0' - 22'
Wash:

RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Symbol	Depth (feet)	Samples	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
			Auger Sample	4" shell then brown Silty Clay & shell fill
			4.5 (P)	becoming hard brown & dark gray w/shells
	5		3.5 (P)	Stiff dark gray & tan Silty Clay w/ferrous nodules & silt pockets-
			2.75 (P)	
⊽			2.25 (P)	becoming tan & light gray
	10		2.0 (P)	becoming medium
			1.5 (P)	
	15		1.25 (P)	
			1.25 (P)	
			1.5 (P)	w/small silt pockets & ferrous nodules
▽	20		1.75 (P)	
				Botom at 22'
	25			

SYMBOL

Standard Penetration Test 140 lb Hammer - 30" Fall

Free Water First Encountered

NOTE: Visual Classifications Only

Undisturbed Sample 3 inch dia Shelby Tube

Water Level After 30 mins. at 8'6" (Prior To Wash Boring)

No Recovery

Water Level After

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise
Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA
CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB-14
Sheet 1 of 1

FILE: 90-056
DATE: 4-25-90
TECH.: E. Paille
DRILLER: G. Matthews

BORING ADVANCE METHOD
Auger: 0' - 16'
Wash: 16' - 18'
RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Ground Water Level	Depth (feet)	Sampling	Standard Penetration Test (blows/foot) / Penetrometer (P) (tons/sq ft)	Description
			Auger Sample	Brown Silty Clay & shell fill
			4.5 (P)	
▽	5		4.25 (P)	Very stiff brown & dark gray Silty Clay
			3.5 (P)	
			4.0 (P)	
	10		3.5 (P)	w/small silt pockets
			2.75 (P)	w/ferrous nodules
	15		1.25 (P)	becoming wet
▽			1.25 (P)	Medium tan & light gray Silty Clay w/large silt pockets
			1.5 (P)	w/o pockets
	20		2.75 (P)	becoming slightly silty w/calcareous nodules
				Bottom at 22'
	25			

SYMBOL

Standard Penetration Test 140 lb Hammer 30" Fall

Undisturbed Sample 3 inch dia Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

▽ Free Water First Encountered

Water Level After 15 mins. at 5'7" (Prior To Wash Boring)

Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

PROJECT: Star Enterprises RFI
Convent, LA

CLIENT: C-K Associates
Baton Rouge, LA

Boring No. RFB-15
Sheet 1 of 1

FILE: 90-056
DATE: 4-24-90
TECH.: E. Paille
DRILLER: G. Matthews

FIELD DATA

BORING ADVANCE METHOD
Auger: 0' - 16'
Wash: 16' - 22'

RIG: 1500 F.
METHOD OF BACKFILLING: Grout

Symbol	Depth (Feet)	Sample	Standard Penetration Test (blows/foot) ~ Penetrometer (P) (tons/sq ft)	Description
			4.5+ (P)	Hard brown Silty Clay w/roots & shell
			4.5 (P)	Very stiff brown Silty Clay
	5		4.5 (P)	
▽			4.0 (P)	becoming slightly silty w/ferrous nodules
			4.0 (P)	
	10		2.0 (P)	Medium brown & tan Silty Clay w/ferrous nodules & organics
			1.5 (P)	becoming tan & gray w/organics
▽	15		1.0 (P)	
			1.0 (P)	w/ferrous nodules & organics
			1.5 (P)	Medium tan & light gray Silty Clay
	20		2.25 (P)	becoming stiff w/calcareous nodules & small silt pockets
				Bottom at 22'
	25			

SYMBOL

Standard Penetration Test 140 lb Hammer - 30" Fall

Undisturbed Sample 3 inch OD Shelby Tube

No Recovery

Compressive Strength From Unconfined Compression Test Unless Noted Otherwise

Strata Boundaries May Not Be Exact

▽ Free Water First Encountered

▽ Water Level After 20 mins. at 8'4" (Prior To Wash Boring)

▼ Water Level After

NOTE: Visual Classifications Only

SOIL TESTING ENGINEERS, INC.

CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

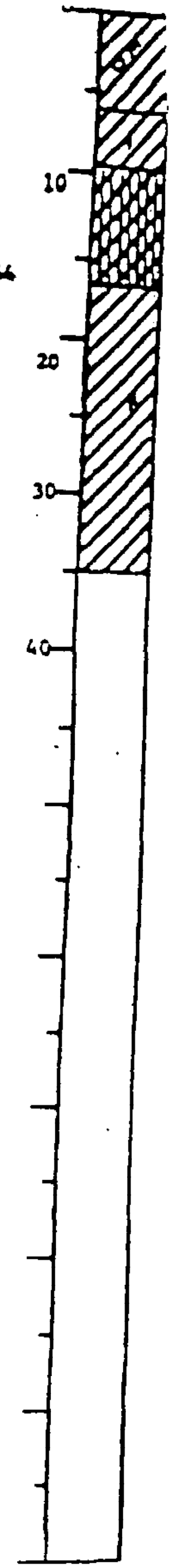
Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. PB -1 Soil Technician J. A. Schexnayder Date 31 December 1964

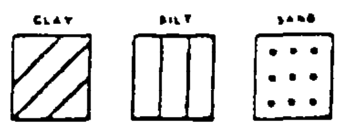
Ground Elev. 8.2 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*Blows Per Foot
	From	To	From	To		
1	2.5	3.0	0.0		Medium stiff gray & tan clay w/trace	
					of organic matter	
2	5.5	6.0		6.0	Ditto	
3	8.5	9.0	6.0	9.5	Stiff tan & gray clay w/silt lenses	
4	11.5	12.0	9.5		Medium stiff tan & gray silty clay	
5	14.5	15.0		16.5	Ditto	
6	19.5	20.0	16.5		Very stiff tan & gray clay w/silt	
7	24.5	25.0			Very Ditto	
8	29.5	30.0			Ditto	
9	34.5	35.0		35.0	Ditto	
	NOTE: Boring located at Coordinates: N 3800, E 7000					

* [illegible]



Remarks:



CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. PB-2 Soil Technician F. O. Bragg Date 29 December 1964

Ground Elev. 7.2 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	Blows Per Foot
			0.0	1.0	Plowed field	
1	2.5	3.0	1.0		Medium stiff gray & tan clay	
2	5.5	6.0			Ditto	
3	8.5	9.0		10.5	Ditto	
4	11.5	12.0	10.5	13.5	Medium stiff gray & tan silty clay	
5	14.5	15.0	13.5	17.0	Soft tan & gray silty clay	
6	19.5	20.0	17.0	22.0	Medium stiff tan & gray silty clay	
7	24.5	25.0	22.0		Very stiff tan & gray clay	
					w/concretions	
8	29.5	30.0		32.0	Ditto	
9	34.5	35.0	32.0	35.0	Stiff tan & gray fissured clay	

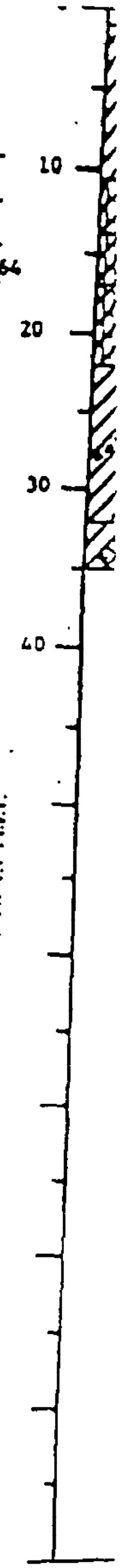
NOTE: Boring located at Coordinates: N 3800, E 7950

Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.

Remarks:

CLAY SILT SAND

Predominant type shown heavy. Modifying type shown light.



CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. PB-3 Soil Technician J. A. Schexnayder Date 31 December 1964

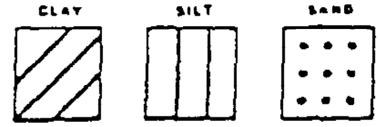
Ground Elev. 8.0 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
1	2.5	3.0	0.0		Stiff gray & tan clay w/silt lenses	
2	5.5	6.0			Ditto	
3	8.5	9.0		9.5	Ditto	
4	11.5	12.0	9.5	13.0	Medium stiff tan & gray clay w/silt lenses	
5	14.5	15.0	13.0	17.0	Soft tan & gray silty clay	
6	19.5	20.0	17.0	21.0	Stiff tan & gray silty clay	
7	24.5	25.0	21.0	26.5	Very stiff tan & gray clay w/trace of silt	
8	29.5	30.0	26.5		Very stiff tan & gray silty clay	
9	34.5	35.0		35.0	Ditto	

NOTE: Boring located at Coordinates: N 1900 E 6650

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.

Remarks:



Predominant type shown heavy. Modifying type shown light.

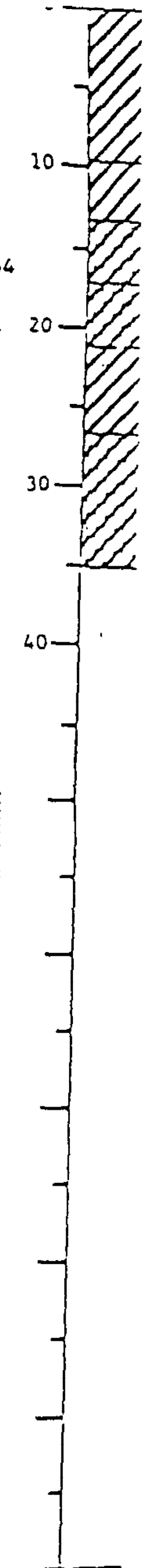


Fig. 5

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. PB-5 Soil Technician F. O. Bragg Date 30 December 1964

Ground Elev. 8.5 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.0	Compact road fill (clay)	
1	2.5	3.0	1.0		Stiff gray & tan clay	
2	5.5	6.0			Ditto	
3	8.5	9.0		10.5	Ditto	
4	11.5	12.0	10.5		Soft tan & gray silty clay	
5	14.5	15.0		17.5	Ditto	
6	19.5	20.0	17.5		Stiff tan & gray clay	
7	24.5	25.0			Ditto	
8	29.5	30.0		32.0	Ditto	
9	34.5	35.0	32.0	35.0	Medium hard tan & gray fissured clay	
	NOTE: Boring located at Coordinates: N 2850, E 7300					

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.

Remarks:

CLAY SILT SAND

METAIRIE LA

Sheet 1 of 2

LOG OF BORING

Name of Project: Texaco Refinery Expansion - Phase I, Increased Sour Crude Facilities

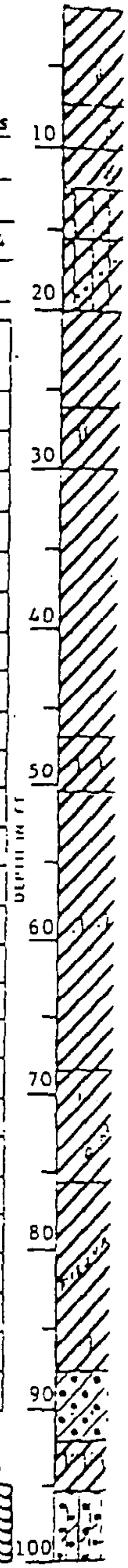
Convent, Louisiana

For: The M. W. Kellogg Company, Houston, Texas

Boring No. 1 Soil Technician Harold Finnin Date 16 & 17 Sept. 1974

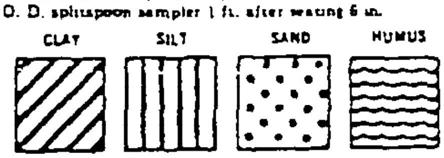
Ground Elev. 99.1 Datum Plant Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
1	0.0	0.5	0.0	0.5	Soft brown silty clay w/roots		
					(Cultivated Field)		
2	1.0	1.5	0.5	1.5	Medium stiff brown & gray clay w/shell		
					fragments & silt pockets		
3	2.5	3.0	1.5		Stiff gray & tan clay w/silt pockets		
4	5.5	6.0		7.5	Ditto		
5	8.5	9.0	7.5	10.0	Medium stiff gray & tan clay w/silt		
					pockets		
6	11.5	12.0	10.0	12.5	Stiff tan & gray clay w/clayey silt		
					pockets		
7	14.5	15.0	12.5	15.5	Soft tan & gray silty clay		
8	19.5	20.0	15.5	20.0	Medium stiff tan & gray silty clay with		
					concretions		
9	24.5	25.0	20.0	26.5	Stiff tan & gray clay		
10	29.5	30.0	26.5	30.0	Stiff tan & gray clay w/silt pockets		
11	34.5	35.0	30.0		Very stiff tan & gray clay		
12	39.5	40.0			Ditto		
13	44.5	45.0		47.0	Ditto		
14	49.5	50.0	47.0	50.5	Stiff tan & gray clay w/silt lenses		
15	54.5	55.0	50.5		Stiff tan & gray clay		
16	59.5	60.0			Stiff tan & gray clay w/sandy silt		
					lenses		
17	64.5	65.0			Stiff tan & gray clay		
18	66.5	67.0		68.5	Ditto		
19	69.5	70.0	68.5		Stiff dark gray clay w/shell fragments		
					& organic matter		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks: Plant Coordinates: N2000, E6650

Predominant type shown heavy. Modifying type shown light.

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METAIRIE LA

Sheet 2 of 2

LOG OF BORING

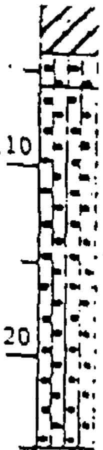
Name of Project: Texaco Refinery Expansion - Phase I, Increased Sour Crude Facilities

Convent, Louisiana

For: The M. W. Kellogg Company, Houston, Texas

Boring No. 1 (Cont'd) Soil Technician Harold Finnin Date 16 & 17 Sept. 1974

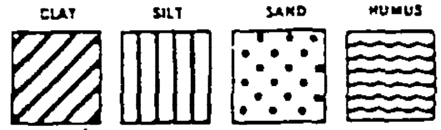
Ground Elev. 99.1 Datum Plant Gr. Water Depth See Text



Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
20	74.5	75.0		76.0	Stiff dark gray clay w/shell fragments		
					& organic matter		
21	79.5	80.0	76.0		Very stiff gray fissured clay		
22	84.5	85.0		88.0	Very stiff gray fissured clay w/some		
					silt		
23	89.5	90.0	88.0	92.5	Medium dense greenish-gray clayey sand		
					w/sand lenses		
24	94.5	95.0	92.5	95.5	Very stiff brown & gray clay w/thick		
					silty sand layers		
25	99.5	100.0	95.5	101.0	Medium dense gray silty fine sand with		
					alternate clay layers		
26	103.5	104.0	101.0	104.0	Very stiff gray clay w/alternate silty		
					fine sand layers & pockets		
27	104.0	105.5	104.0	106.0	Dark gray silty fine sand	5	31
28	106.0	107.5	106.0		Very dense gray silty fine sand	30	50=9"
29	108.5	110.0			Ditto	27	50=8"
30	113.5	115.0			Ditto	26	50=11"
31	118.5	120.0			Ditto	43	50=6"
32	123.5	125.0		125.0	Ditto	50	(Seat)

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks: Plant Coordinates: N2000, E6650

Predominant type shown heavy. Modifying type shown light.

(Shee

METAIRIE LA

LOG OF BORING

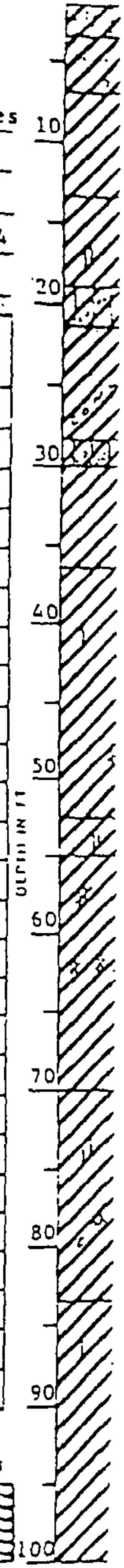
Name of Project: Texaco Refinery Expansion - Phase I, Increased Sour Crude Facilities

Convent, Louisiana

For: The M. W. Kellogg Company, Houston, Texas

Boring No. 3 Soil Technician Harold Finnin Date 18 & 19 Sept. 1974

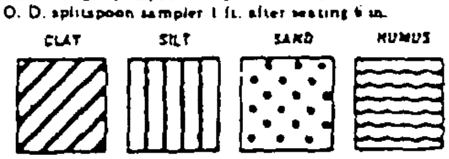
Ground Elev. 101.3 Datum Plant Gr. Water Depth See Text



Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
1	0.0	0.5	0.0	1.5	Medium stiff brown silty clay		
					(Cultivated Field)		
2	2.5	3.0	1.5	3.5	Medium stiff tan & gray silty clay with		
					shell fragments		
3	5.5	6.0	3.5	7.0	Medium stiff brown & gray clay w/sand		
					layers & shell fragments		
4	8.5	9.0	7.0		Medium stiff gray & tan clay		
5	11.5	12.0		13.5	Ditto		
6	14.5	15.	13.5	19.0	Stiff gray & tan clay w/silt pockets		
7	19.5	20.0	19.0	21.5	Medium stiff tan & gray silty clay		
					w/concretions		
8	24.5	25.0	21.5	28.5	Stiff tan & gray clay w/concretions		
9	29.5	30.0	28.5	30.0	Very stiff tan & gray silty clay with		
					concretions		
10	34.5	35.0	30.0	36.5	Stiff tan & gray clay		
11	39.5	40.0	36.5		Very stiff tan & gray clay w/some silt		
12	44.0	45.0			Ditto		
13	49.5	50.0		52.5	Very stiff tan & gray clay w/few clayey		
					silt pockets		
14	54.5	55.0	52.5	55.0	Stiff tan & gray clay w/silt pockets		
15	59.5	60.0	55.0		Stiff tan & gray clay w/clayey silt		
					pockets & layers		
16	64.5	65.0			Ditto		
17	69.5	70.0		70.0	Ditto		
18	74.5	75.0	70.0		Stiff gray clay w/silt pockets & trace		
					of organic matter		

*Number in first column indicates number of blows of 140-lb hammer dropped 30 in. required to seat 2-in. O. D splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks: Plant Coordinates: N3000, E6150

Predominant type shown heavy. Modifying type shown light.

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METAIRIE, LA

Sheet 2 of 2

LOG OF BORING

Name of Project: Texaco Refinery Expansion - Phase I, Increased Sour Crude Facilities
Convent, Louisiana

For: The M. W. Kellogg Company, Houston, Texas

Boring No. 3 (Cont'd) Soil Technician Harold Finnin Date 18 & 19 Sept. 1974

Ground Elev. 101.3 Datum Plant Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
19	79.5	80.0		83.5	Stiff gray clay w/silt pockets & trace		
					of organic matter		
20	84.5	85.0	83.5		Stiff gray clay w/trace of silt		
21	89.5	90.0			Stiff gray clay		
22	94.5	95.0			Ditto		
23	99.5	100.0		100.0	Ditto		

DEPTH IN FT

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

CLAY SILT SAND HUMUS

Remarks: Plant Coordinates: N3000, E6150

Predominant type shown heavy. Modifying type shown light.

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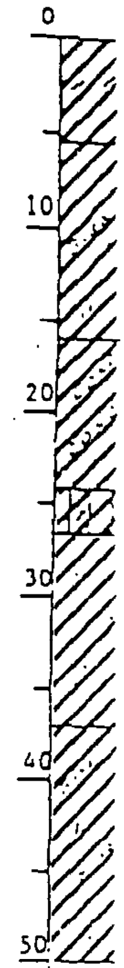
EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE LA.



Name of Project: Texaco Inc.
Refinery Expansion, Phase II, Increased Sour Crude Facilities
Convent, Louisiana
For: Pullman Kellogg, Houston, Texas

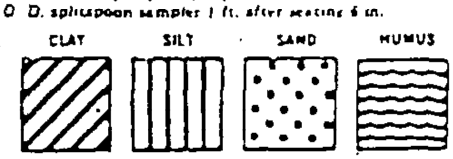
Boring No. 125 Soil Technician George Hardee Date 9 July 1977

Ground Elev. 101.96 Datum Plant Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
1	2.0	2.5	0.0		Stiff tan & gray clay w/clayey silt		
					layers		
2	5.0	5.5		5.5	Ditto		
3	8.0	8.5	5.5		Soft to medium stiff tan & gray		
					fissured clay w/silt pockets		
4	11.0	11.5			Ditto		
5	14.0	14.5		16.0	Ditto		
6	18.0	18.5	16.0	24.0	Soft gray & tan clay w/concretions		
7	24.0	24.5	24.0	26.5	Very stiff tan & gray silty clay with		
					clayey silt pockets		
8	28.0	28.5	26.5		Stiff tan & gray clay w/silt pockets		
9	33.0	33.5		37.0	Ditto		
10	38.0	38.5	37.0		Stiff to very stiff tan & gray		
					fissured clay		
11	43.0	43.5			Stiff to very stiff tan & gray fissured		
					clay w/silt pockets		
12	48.0	48.5		50.0	Stiff to very stiff tan & gray fissured		
					clay		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks: Boring Coordinates:
N2650; E6160.

Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

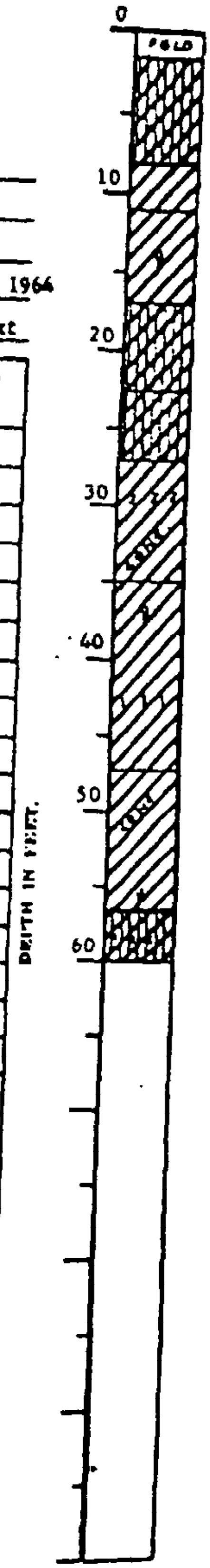
LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. CB-2 Soil Technician Dick Toups Date 12 November 1964

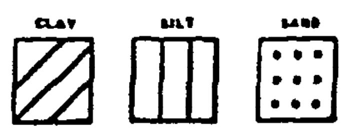
Ground Elev. 16.5 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.5	Plowed Field	
1	2.5	3.0	1.5		Medium stiff brown & gray silty clay	
2	5.5	6.0		8.0	Ditto	
3	8.5	9.0	8.0	11.0	Soft gray & tan clay	
4	11.5	12.0	11.0		Stiff gray & tan clay w/trace of silt	
5	14.5	15.0		17.0	Ditto	
6	19.5	20.0	17.0	22.5	Very stiff gray & tan silty clay	
7	22.5	23.0	22.5		Medium stiff tan & gray silty clay	
					w/clayey silt layers	
8	24.5	25.0		27.0	Ditto	
9	29.5	30.0	27.0		Stiff tan & gray clay w/silty clay	
					layers & concretions	
10	34.5	35.0		35.0	Ditto	
11	39.5	40.0	35.0		Very stiff light gray & tan clay with	
					some silt & silt layers	
12	44.5	45.0		47.0	Ditto	
13	49.5	50.0	47.0		Very stiff tan & gray clay w/few con-	
					cretions	
14	54.5	55.0		56.5	Very stiff tan & gray clay w/trace of	
					silt	
15	59.5	60.0	56.5	60.0	Stiff tan & gray silty clay w/few silt	
					layers	
NOTE:	Boring located at				Coordinates: N 3288.2, E 3152.5.	



* Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.

Remarks:



Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

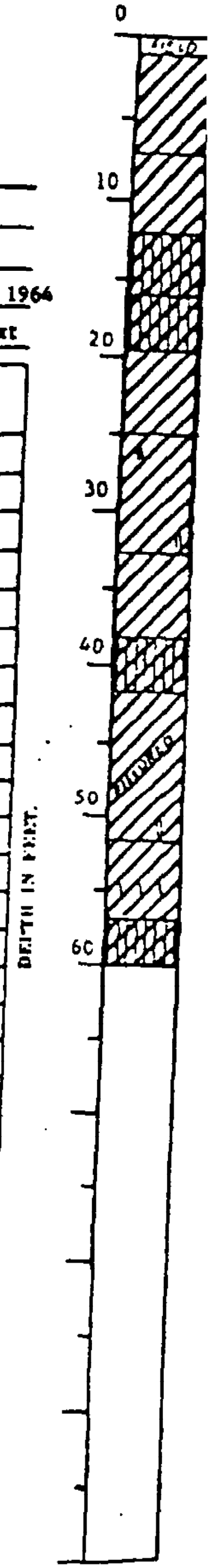
Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. CB-5 Soil Technician Dick Toups Date 12 November 1964

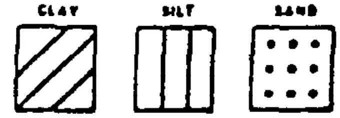
Ground Elev. 15.3 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	To	Depth Stratum Feet From	To	Visual Classification	*Blows Per Foot
			0.0	1.0	Plowed Field	
1	2.5	3.0	1.0		Medium stiff brown & gray clay	
2	5.5	6.0		7.0	Ditto	
3	8.5	9.0	7.0		Medium stiff gray & tan clay	
4	11.5	12.0		12.0	Ditto	
5	14.5	15.0	12.0	16.0	Stiff tan & gray silty clay	
6	17.0	17.5	16.0	19.5	Soft tan & gray silty clay	
7	19.5	20.0	19.5		Stiff to very stiff tan & gray clay	
8	21.0	21.5			Ditto	
9	24.5	25.0		25.0	Ditto	
10	29.5	30.0	25.0	32.5	Very stiff brown & gray clay w/silt	
					pockets	
11	34.5	35.0	32.5	38.0	Very stiff tan & gray clay	
12	39.5	40.0	38.0	41.5	Stiff tan & gray silty clay	
13	44.5	45.0	41.5		Stiff tan & gray fissured clay	
14	49.5	50.0		51.5	Stiff tan & gray fissured clay w/trace	
					of silt	
15	54.5	55.0	51.5	57.0	Stiff tan & gray clay w/silt layers	
16	59.5	60.0	57.0	60.0	Stiff tan & gray silty clay	
	NOTE: Boring located at Coordinates: N 2688.2, E 3152.5.					

*Number of blows of 140 lb hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.



Remarks:



Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

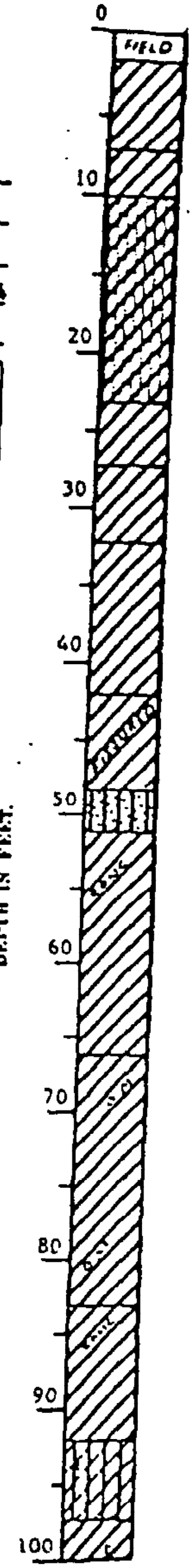
LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. CB-8 Soil Technician F. O. Brazz Date December 1964
Ground Elev. 9.6 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.5	Plowed Field	
1	2.5	3.0	1.5		Medium stiff tan & gray clay	
2	5.5	6.0		7.0	Ditto	
3	8.5	9.0	7.0	10.0	Stiff tan & gray clay	
4	11.5	12.0	10.0		Medium stiff tan & gray silty clay	
5	14.5	15.0			Medium stiff tan & gray silty clay	
					w/concretions	
6	19.5	20.0		23.0	Ditto	
7	24.5	25.0	23.0	27.0	Very stiff tan & gray clay	
8	29.5	30.0	27.0	32.0	Stiff tan & gray clay	
9	34.5	35.0	32.0		Very stiff tan & gray clay	
10	39.5	40.0		42.0	Ditto	
11	44.5	45.0	42.0	48.0	Stiff tan & gray fissured clay	
12	49.5	50.0	48.0	51.0	Medium compact tan & gray sandy silt	
13	54.5	55.0	51.0		Stiff tan & gray clay w/concretions	
14	59.5	60.0			Ditto	
15	64.5	65.0		66.0	Stiff tan & gray clay	
16	69.5	70.0	66.0		Stiff gray clay w/trace organic matter	
17	74.5	75.0			Ditto	
18	79.5	80.0		83.0	Stiff gray clay	
19	84.5	85.0	83.0		Stiff greenish-gray clay w/concretions	
20	89.5	90.0		92.0	Stiff greenish-gray clay w/sand lenses	
21	94.5	95.0	92.0	97.0	Medium compact gray clayey silt w/silty	
					sand lenses	
22	99.5	100.0	97.0	100.0	Stiff gray clay w/silty sand lenses	
	NOTE:	Boring located at	Coordinates:		N 2488.2, E 5802.5.	

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.



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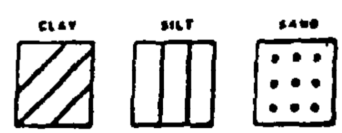


Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

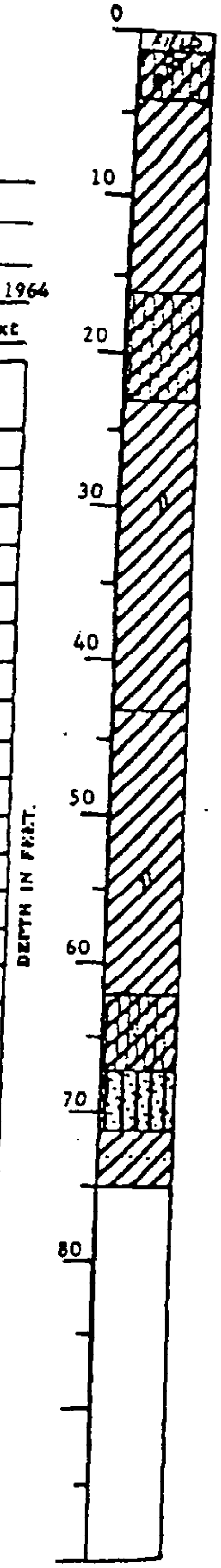
Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. CB-9 Soil Technician F. O. Bragg Date 11 November 1964

Ground Elev. 13.4 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.0	Plowed Field	
1	2.5	3.0	1.0	4.0	Very stiff tan & gray silty clay with	
					trace of organic matter	
2	5.5	6.0	4.0		Stiff tan & gray clay	
3	8.5	9.0			Ditto	
4	11.5	12.0			Ditto	
5	14.5	15.0		16.0	Ditto	
6	19.5	20.0	16.0	23.0	Soft tan & gray silty clay	
7	24.5	25.0	23.0		Stiff to very stiff tan & gray clay	
8	29.5	30.0			Stiff to very stiff tan & gray clay	
					w/silt pockets	
9	34.5	35.0			Ditto	
10	39.5	40.0		43.0	Ditto	
11	44.5	45.0	43.0		Very stiff tan & gray clay	
12	49.5	50.0			Ditto	
13	54.5	55.0			Very stiff tan & gray clay w/silt	
					pockets	
14	49.5	50.0		62.0	Very stiff tan & gray clay	
15	64.5	65.0	62.0	67.0	Medium stiff tan & gray silty clay	
					w/sand lenses	
16	69.5	70.0	67.0	71.0	Medium compact tan sandy silt w/sand	
					layers	
17	74.5	75.0	71.0	75.0	Stiff gray clay w/sand lenses	
NOTE:	Boring located at Coordinates: N 2088.2, E 3152.5.					

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.



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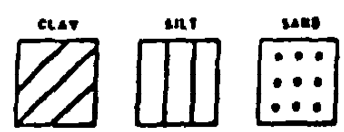


EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

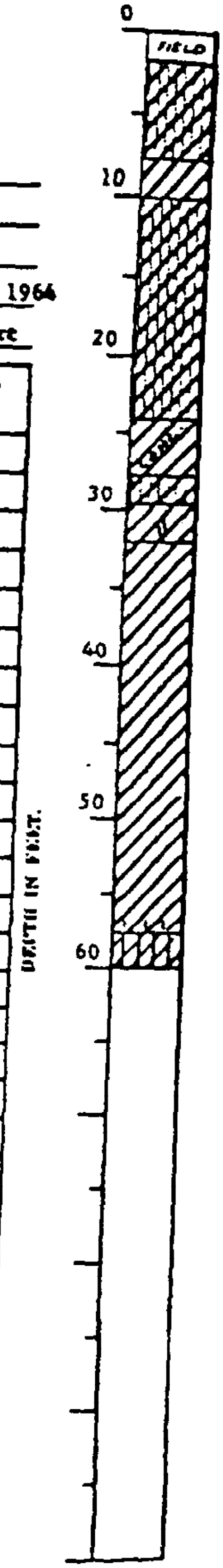
Boring No. CB-10 Soil Technician Dick Toups Date 11 November 1964

Ground Elev. 12.0 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.5	Plowed Field	
1	2.5	3.0	1.5		Medium stiff brown & gray silty clay	
2	5.5	6.0		7.5	Ditto	
3	8.5	9.0	7.5	10.0	Stiff tan & gray clay	
4	11.5	12.0	10.0		Stiff tan & gray silty clay	
5	14.5	15.0			Ditto	
6	17.5	18.0			Ditto	
7	19.5	20.0		24.0	Ditto	
8	24.5	25.0	24.0	27.5	Stiff tan & gray clay w/concretions	
9	27.5	28.0	27.5	29.5	Stiff tan & gray silty clay	
10	29.5	30.0	29.5	32.0	Very stiff tan & gray clay w/trace of silt	
11	34.5	35.0	32.0		Stiff tan & gray clay	
12	39.5	40.0			Ditto	
13	44.5	45.0			Ditto	
14	49.5	50.0			Ditto	
15	54.5	55.0		57.5	Stiff tan & gray clay w/silt layers	
16	59.5	60.0	57.5	60.0	Medium compact tan & gray clayey silt	

NOTE: Boring located at Coordinates: N 2088.2, E 4102.5.

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 1 in. split-spoon sampler 1 ft. after first being driven 6 in.



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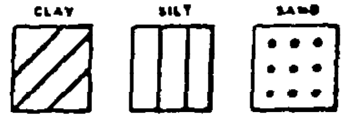


Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

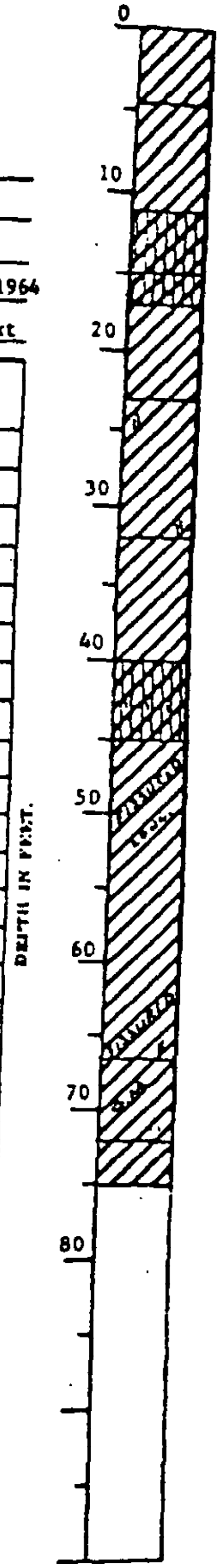
Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. CB-11 Soil Technician Dick Toups Date 11 November 1964

Ground Elev. 10.0 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	To	Depth Stratum Feet From	To	Visual Classification	*Blows Per Foot
1	2.5	3.0	0.0	4.5	Stiff brown & gray clay	
2	5.5	6.0	4.5		Medium stiff gray & tan clay	
3	8.5	9.0		11.0	Ditto	
4	11.5	12.0	11.0		Stiff tan & gray silty clay	
5	14.5	15.0		15.0	Ditto	
6	17.5	18.0	15.0	17.0	Medium stiff tan & gray silty clay	
7	19.5	20.0	17.0	23.0	Stiff tan & gray clay	
8	24.5	25.0	23.0		Very stiff tan & gray clay w/trace of	
					silt	
9	29.5	30.0		32.0	Ditto	
10	34.5	35.0	32.0		Stiff tan & gray clay	
11	39.5	40.0		40.0	Ditto	
12	44.5	45.0	40.0	45.0	Medium stiff tan & gray silty clay	
					w/silt layers	
13	49.5	50.0	45.0		Stiff tan & gray fissured clay	
14	54.5	55.0			Stiff tan & gray fissured clay w/con-	
					cretions	
15	59.5	60.0			Ditto	
16	64.5	65.0		66.5	Stiff tan & gray fissured clay w/silt	
					pockets & layers	
17	69.5	70.0	66.5	72.0	Medium stiff dark gray clay w/organic	
					matter & sand pockets	
18	74.5	75.0	72.0	75.0	Stiff greenish-gray clay	
NOTE:	Boring located at				Coordinates: N 2088.2, E 4852.5.	

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.



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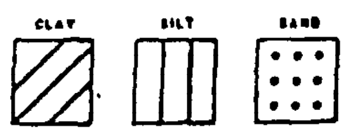


EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Sheet 1 of 2

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

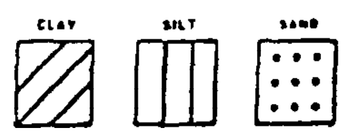
Boring No. CB-15 Soil Technician F. O. Bragg Date 16-17 Nov. 1964

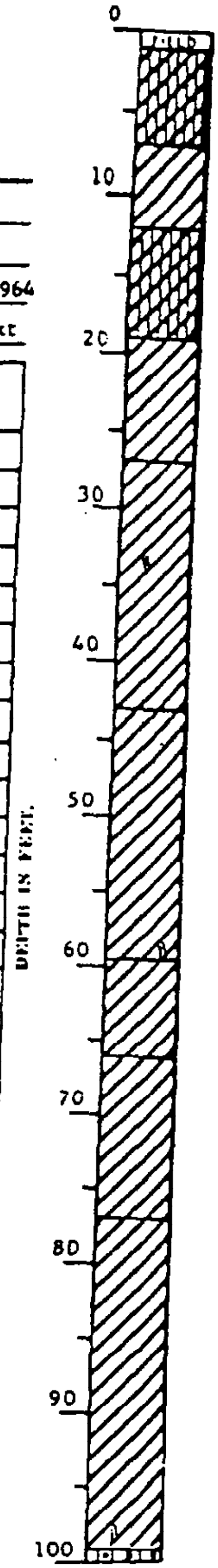
Ground Elev. 11.3 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.0	Plowed Field	
1	2.5	3.0	1.0		Stiff brown & gray silty clay	
2	5.5	6.0		7.0	Ditto	
3	8.5	9.0	7.0		Medium stiff tan & gray clay	
4	11.5	12.0		12.0	Ditto	
5	14.5	15.0	12.0	19.0	Very soft tan & gray silty clay	
6	19.5	20.0	19.0		Stiff tan & gray clay	
7	24.5	25.0		27.0	Stiff tan & gray clay	
8	29.5	30.0	27.0		Very stiff tan & gray clay	
9	34.5	35.0			Very stiff tan & gray clay w/silt pockets	
10	39.5	40.0		43.0	Ditto	
11	44.5	45.0	43.0		Very stiff tan & gray clay	
12	49.5	50.0			Ditto	
13	54.5	55.0		59.5	Very stiff tan & gray clay w/silt pockets	
14	59.5	60.0	59.5		Very stiff tan & gray clay	
15	64.5	65.0		66.0	Ditto	
16	69.5	70.0	66.0		Stiff dark gray clay	
17	74.5	75.0		77.0	Ditto	
18	79.5	80.0	77.0		Stiff gray clay	
19	84.5	85.0			Ditto	
20	89.5	90.0			Stiff gray clay w/silt lenses	
21	94.5	95.0		99.0	Ditto	
22	99.0	100.5	99.0		Medium dense gray silty sand	4 18
23	103.5	105.0		107.0	Ditto	6 21

*Number of blows of 140 lb. hammer dropped 30 in. required to drive [illegible]

Remarks: First number in column headed "Blows per Foot" indicates the number of blows required to seat splitspoon sampler first 6 inches.





EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

Sheet 2 of 2

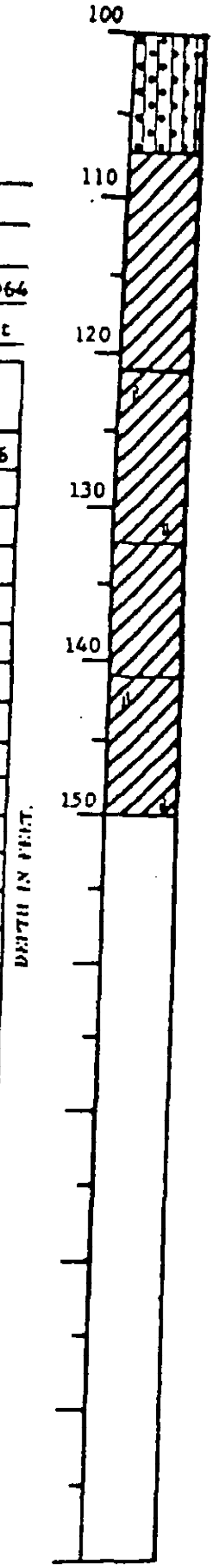
LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

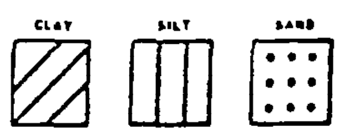
Boring No. CB-15 (cont'd) Soil Technician F. O. Bragg Date 16-17 Nov. 1964
Ground Elev. 11.3 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
24	108.5	110.0	107.0		Very stiff gray & tan clay	5 16
25	114.5	115.0			Ditto	
26	119.5	120.0		121.0	Ditto	
27	124.5	125.0	121.0		Very stiff gray clay w/silt lenses	
28	129.5	130.0		132.0	Ditto	
29	134.5	135.0	132.0		Stiff dark gray clay	
30	139.5	140.0		141.0	Ditto	
31	144.5	145.0	141.0		Very stiff gray clay w/silt lenses	
32	149.5	150.0		150.0	Ditto	
NOTE: Boring located at Coordinates: N 1688.2, E 4402.5.						

*Blows of 140 lb hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft after first being driven 6 in.



Remarks: First number in column headed "Blows per Foot" indicates the number of blows required to seat splitspoon sampler first 6 inches.



EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

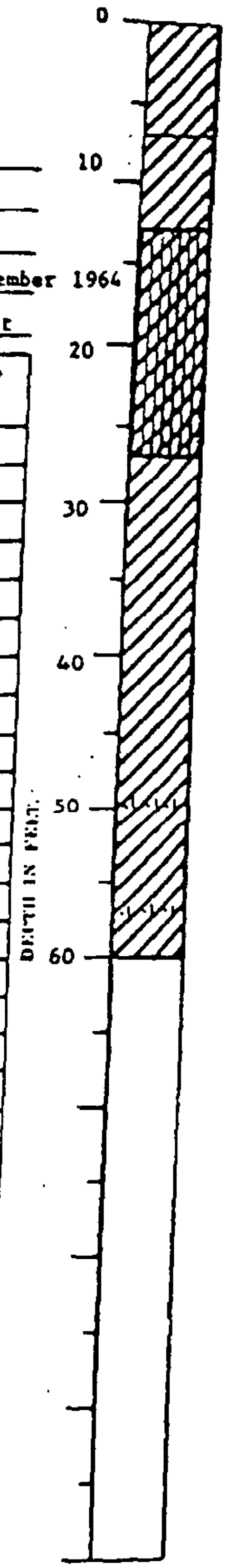
Boring No. CB-36 Soil Technician F. O. Bragg Date 27 & 30 November 1964

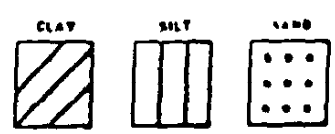
Ground Elev. 15.2 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	To	Depth Stratum Feet From	To	Visual Classification	*Blows Per Foot
1	2.5	3.0	0.0		Medium stiff tan & gray clay	
2	5.5	6.0		7.0	Ditto	
3	8.5	9.0	7.0		Stiff tan & gray clay	
4	11.5	12.0		13.0	Ditto	
5	14.5	15.0	13.0		Medium stiff tan & gray silty clay	
6	19.5	20.0			Ditto	
7	24.5	25.0		27.0	Ditto	
8	29.5	30.0	27.0		Stiff to very stiff tan & gray clay	
9	34.5	35.0			Ditto	
10	39.5	40.0			Ditto	
11	44.5	45.0			Ditto	
12	49.5	50.0			Stiff to very stiff tan & gray clay	
					w/sandy silt layer	
13	54.5	55.0			Ditto	
14	59.5	60.0		60.0	Ditto	
	NOTE:	Boring located at Coordinates: N 1838.2, E 2352.5.				

*No. of blows of 140 lb hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft after first being driven 6 in.

Remarks:





Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. PB -1 Soil Technician J. A. Schexnayder Date 31 December 1964

Ground Elev. 8.2 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
1	2.5	3.0	0.0		Medium stiff gray & tan clay w/trace	
					of organic matter	
2	5.5	6.0		6.0	Ditto	
3	8.5	9.0	6.0	9.5	Stiff tan & gray clay w/silt lenses	
4	11.5	12.0	9.5		Medium stiff tan & gray silty clay	
5	14.5	15.0		16.5	Ditto	
6	19.5	20.0	16.5		Very stiff tan & gray clay w/silt	
7	24.5	25.0			Very Ditto	
8	29.5	30.0			Ditto	
9	34.5	35.0		35.0	Ditto	

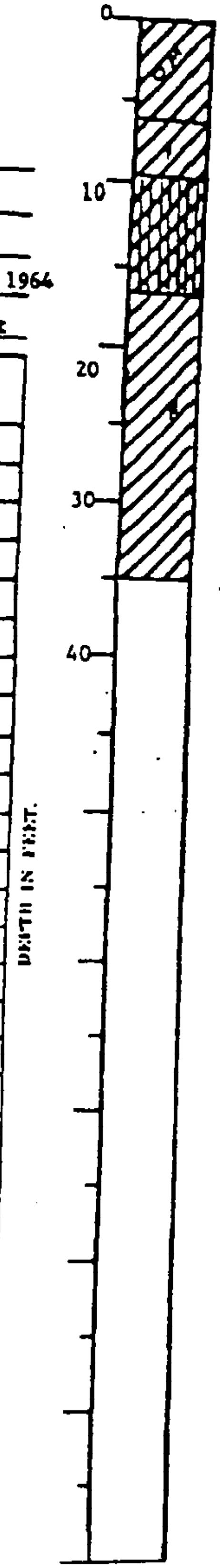
NOTE: Boring located at Coordinates: N 3800, E 7000

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.

Remarks:

CLAY SILT SAND

Predominant type shown heavy. Modifying type shown light.



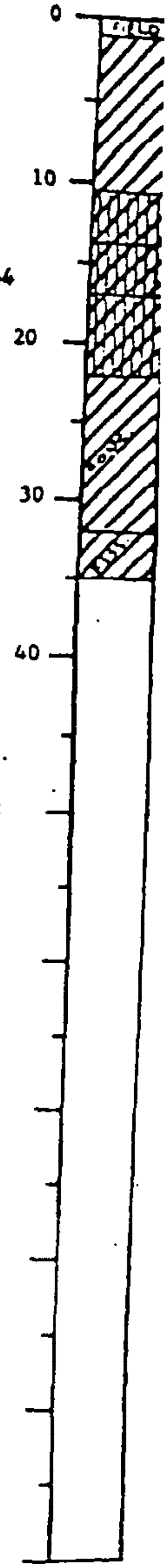
EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

Boring No. PB-2 Soil Technician F. O. Bragg Date 29 December 1964

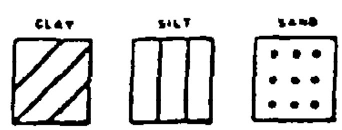
Ground Elev. 7.2 Datum MSL Gr. Water Depth See Text



Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.0	Plowed field	
1	2.5	3.0	1.0		Medium stiff gray & tan clay	
2	5.5	6.0			Ditto	
3	8.5	9.0		10.5	Ditto	
4	11.5	12.0	10.5	13.5	Medium stiff gray & tan silty clay	
5	14.5	15.0	13.5	17.0	Soft tan & gray silty clay	
6	19.5	20.0	17.0	22.0	Medium stiff tan & gray silty clay	
7	24.5	25.0	22.0		Very stiff tan & gray clay	
					w/concretions	
8	29.5	30.0		32.0	Ditto	
9	34.5	35.0	32.0	35.0	Stiff tan & gray fissured clay	
					NOTE: Boring located at Coordinates: N 3800, E 7950	

*Number of blows of 140 lb. [illegible] dropped 30 in. required to drive [illegible] in. [illegible] sampler 1 ft. after first being driven 6 in.

Remarks:



Predominant type shown heavy. Modifying type shown light.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
NEW ORLEANS, LA.

LOG OF BORING

Name of Project: Texaco Incorporated - Louisiana Plant
Union, St. James Parish, Louisiana
For: Bechtel Corporation, San Francisco, California

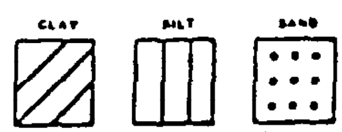
Boring No. PB-5 Soil Technician F. O. Bragg Date 30 December 1964

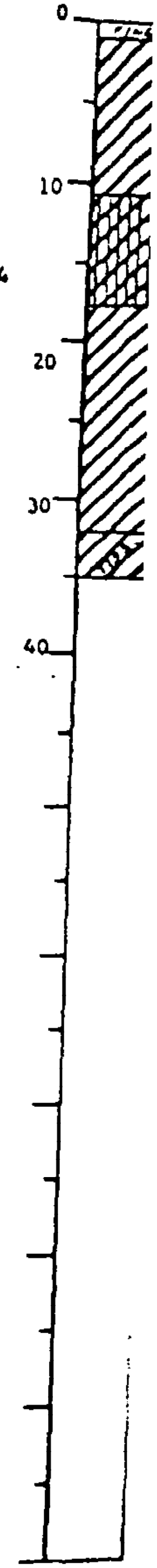
Ground Elev. 8.5 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Blows Per Foot
			0.0	1.0	Compact road fill (clay)	
1	2.5	3.0	1.0		Stiff gray & tan clay	
2	5.5	6.0			Ditto	
3	8.5	9.0		10.5	Ditto	
4	11.5	12.0	10.5		Soft tan & gray silty clay	
5	14.5	15.0		17.5	Ditto	
6	19.5	20.0	17.5		Stiff tan & gray clay	
7	24.5	25.0			Ditto	
8	29.5	30.0		32.0	Ditto	
9	34.5	35.0	32.0	35.0	Medium hard tan & gray fissured clay	
	NOTE: Boring located at Coordinates: N 2850, E 7300					

*Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler 1 ft. after first being driven 6 in.

Remarks:





LOG OF BORING

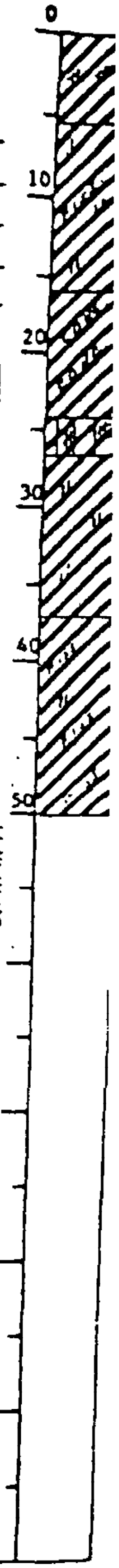
EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Texaco Inc.
Refinery Expansion, Phase II, Increased Sour Crude Facilities
Convent, Louisiana
For: Pullman Kellogg, Houston, Texas

Boring No. 125 Soil Technician George Hardee Date 9 July 1977

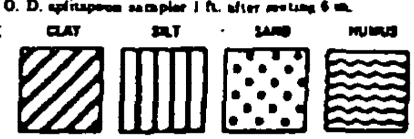
Ground Elev. 101.96 Datum Plant Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test
1	2.0	2.5	0.0		Stiff tan & gray clay w/clayey silt layers	
2	5.0	5.5		5.5	Ditto	
3	8.0	8.5	5.5		Soft to medium stiff tan & gray fissured clay w/silt pockets	
4	11.0	11.5			Ditto	
5	14.0	14.5		16.0	Ditto	
6	18.0	18.5	16.0	24.0	Soft gray & tan clay w/concretions	
7	24.0	24.5	24.0	26.5	Very stiff tan & gray silty clay with clayey silt pockets	
8	28.0	28.5	26.5		Stiff tan & gray clay w/silt pockets	
9	33.0	33.5		37.0	Ditto	
10	38.0	38.5	37.0		Stiff to very stiff tan & gray fissured clay	
11	43.0	43.5			Stiff to very stiff tan & gray fissured clay w/silt pockets	
12	48.0	48.5		50.0	Stiff to very stiff tan & gray fissured clay	



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Predominant type shown heavy. Modifying type shown light.

Remarks: Boring Coordinates:
N2650; E6160.

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-2

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.
1	2.5	Medium stiff brown & gray silty clay	32.1	86.0	113.6	1240
2	5.5	Ditto	35.4	84.4	114.3	1225
3	8.5	Soft gray & tan clay	42.3	78.3	111.4	870
4	11.5	Stiff gray & tan clay	32.1	90.0	118.9	2805
5	14.5	Ditto	30.8	91.4	119.6	2835
6	19.5	Very stiff gray & tan silty clay	24.1	101.6	126.1	4825
7	22.5	Medium stiff gray & tan silty clay	30.2	92.6	120.6	1745
8	24.5	Ditto	31.0	91.4	119.7	1105
9	29.5	Stiff tan & gray clay w/concretions	27.3	96.6	122.0	3055
10	34.5	Ditto	36.2	85.6	116.6	2520

BORING CB-3

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.
1	2.5	Stiff tan & gray silty clay	26.9	94.8	120.3	3065
2	5.5	Medium stiff tan & gray clay	36.0	84.1	114.4	1585
3	8.5	Ditto	33.0	88.6	117.8	1675
4	11.5	Ditto	36.2	84.6	115.2	1695
5	14.5	Stiff gray & tan clay	27.3	97.1	123.6	2515
6	19.5	Soft gray & tan silty clay	31.0	91.4	119.7	720
7	24.5	Stiff tan & gray clay	24.4	101.4	126.1	2565
8	29.5	Ditto	30.5	93.2	121.6	3945
9	34.5	Very stiff tan & gray clay	19.3	110.6	119.3	8750

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-5

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.	Atterberg Limits LL	PL	PI
1	2.5	Medium stiff brown & gray clay	35.3	85.2	115.3	1955	57	28	29
2	5.5	Ditto	40.2	81.1	113.7	1360	76	22	54
3	8.5	Medium stiff gray & tan clay	35.1	86.8	117.3	1650			
4	11.5	Ditto	31.5	92.1	121.1	1810	65		
5	14.5	Stiff tan & gray silty clay	26.4	100.2	126.7	2795	44		
6	17.0	Soft tan & gray silty clay	28.8	96.9	124.8	785	30		
7	19.5	Stiff tan & gray clay	23.1	105.9	130.4	2595	39		
8	21.0	Ditto	25.9	100.7	126.8	2260			
9	24.5	Very stiff tan & gray clay	24.0	103.4	128.2	4825			
10	29.5	Stiff brown & gray clay w/silt pockets	36.7	85.4	116.7	3190	81		
11	34.5	Very stiff tan & gray clay	21.5	107.8	131.0	6835			
12	39.5	Stiff tan & gray silty clay	24.5	101.3	126.1	3325			
13	44.5	Stiff tan & gray fissured clay	32.0	91.5	120.8	3260	69		
14	49.5	Medium stiff tan & gray fissured clay	35.8	86.8	117.9	1560			
15	54.5	Stiff tan & gray clay w/silt layers	25.6	101.2	127.1	2765			
16	59.5	Stiff tan & gray silty clay	26.5	99.8	126.2	3065	36		

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-8

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
1	2.5	Medium stiff tan & gray clay	38.9	83.0	115.3	1345	66	27	39
2	5.5	Ditto	41.6	79.6	112.7	1255	82	24	58
3	8.5	Stiff tan & gray clay	42.3	79.2	112.7	2015			
4	11.5	Medium stiff tan & gray silty clay	30.5	94.2	122.9	1695			
5	14.5	Medium stiff gray & tan silty clay w/small concretions	25.8	98.1	123.4	1115			
6	19.5	Ditto	23.4	103.7	128.0	1495			
7	24.5	Very stiff tan & gray clay	24.2	101.5	126.1	5530			
8	29.5	Stiff tan & gray clay	33.2	89.0	118.5	2385			
9	34.5	Very stiff tan & gray clay	26.1	99.2	125.1	5350			
10	39.5	Ditto	30.3	93.4	121.7	4305			
11	44.5	Stiff tan & gray fissured clay	38.8	82.9	115.1	2140			
12	49.5	Medium compact tan & gray sandy silt	29.5	95.4	123.5	ϕ=4° c=145*			
13	54.5	Stiff tan & gray clay w/concretions	40.1	----	-----	----			
14	59.5	Ditto	38.3	82.9	114.7	2740			
15	64.5	Stiff tan & gray clay	34.7	87.1	117.3	2190			
16	69.5	Stiff gray clay w/trace of organic matter	40.9	80.2	113.0	2145			
17	74.5	Ditto	38.0	85.3	117.7	2600			
18	79.5	Stiff gray clay	36.4	86.3	117.7	3040			
19	84.5	Stiff greenish-gray clay w/concretions	23.0	101.6	125.0	3770			
20	89.5	Stiff greenish-gray clay w/sand lenses	27.9	96.9	123.9	2485			
21	94.5	Medium compact gray clayey silt w/silty sand lenses	26.2	99.4	125.4	ϕ=0° c=585*			
22	99.5	Stiff gray clay with silty sand lenses	31.9	94.1	124.1	2210			

* Quick Triaxial Shear Test.
ϕ=Angle of internal friction; c=Cohesion in pounds per sq. ft.

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-9

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.
1	2.5	Very stiff tan & gray silty clay	25.4	96.4	120.9	4745
2	5.5	Stiff tan & gray clay	30.7	91.9	120.1	2565
3	8.5	Ditto	30.7	92.0	120.2	2425
4	11.5	Ditto	26.8	98.1	124.4	3180
5	14.5	Ditto	27.1	97.4	123.8	2250
6	19.5	Soft tan & gray silty clay	32.8	89.5	118.9	560
7	24.5	Very stiff tan & gray clay	22.7	104.9	128.7	6060
8	29.5	Stiff tan & gray clay w/silt pockets	28.5	95.6	122.8	3205
9	34.5	Very stiff tan & gray clay	21.1	107.2	129.8	6510

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-10

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.	Atterberg Limits LL	PL	PI
1	2.5	Medium stiff brown & gray silty clay	33.5	85.3	113.9	1635	55	25	30
2	5.5	Ditto	32.5	89.0	117.9	1365	56	19	37
3	8.5	Stiff tan & gray clay	38.0	84.7	116.9	2320			
4	11.5	Stiff tan & gray silty clay	26.7	99.1	125.6	2340			
5	14.5	Ditto	25.3	102.1	127.9	2230	41		
7	19.5	Ditto	22.9	105.4	129.5	3155	39		
9	27.5	Ditto	21.2	107.9	129.7	3375			
10	29.5	Very stiff tan & gray clay	20.6	108.7	131.1	6365			
11	34.5	Stiff tan & gray clay	25.6	100.1	125.7	2260	50		
12	39.5	Ditto	30.2	93.2	121.3	3220			
13	44.5	Ditto	30.3	93.1	121.3	2990			
14	49.5	Ditto	35.1	86.4	116.7	2720	74		
15	54.5	Stiff tan & gray clay w/silt layers	31.7	90.1	118.7	3150			
16	59.5	Medium compact tan clayey silt	27.2	97.4	123.9	ϕ=5° c=170*			

* Quick Triaxial Shear Test.

ϕ = Angle of internal friction;

c = Cohesion in pounds per sq. ft.

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-11

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.
1	2.5	Stiff brown & gray clay	34.7	84.9	114.4	2390
2	5.5	Medium stiff gray & tan clay	35.5	85.3	115.6	1800
3	8.5	Ditto	36.2	84.0	114.4	1410
4	11.5	Stiff tan & gray silty clay	25.4	100.2	125.7	3360
5	14.5	Ditto	26.0	99.1	124.9	2115
6	17.5	Medium stiff tan & gray silty clay	27.8	97.8	125.0	1360
7	19.5	Stiff tan & gray clay	23.4	102.9	127.0	2005
8	24.5	Very stiff tan & gray clay	24.7	100.9	125.8	4115
9	29.5	Ditto	23.5	102.8	127.0	4615
10	34.5	Stiff tan & gray clay	31.8	90.8	119.7	2905
11	39.5	Ditto	29.5	94.9	122.9	2440
13	49.5	Stiff tan & gray fissured clay	40.9	80.4	113.3	2810
14	54.5	Stiff tan & gray fissured clay	35.9	85.4	116.1	2735
16	64.5	Ditto	35.1	87.9	118.8	2925
18	74.5	Stiff greenish-gray clay	38.3	83.8	115.9	3305

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING CB-36

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.	Atterberg Limits LL	PL	PI
1	2.5	Medium stiff tan & gray clay	35.4	84.9	115.0	1205	48	22	26
2	5.5	Ditto	41.5	86.9	123.0	1905	51	19	32
3	8.5	Stiff tan & gray clay	29.7	94.5	122.6	2475			
4	11.5	Ditto	26.8	99.0	125.5	2645			
5	14.5	Medium stiff tan & gray silty clay	27.2	98.7	125.5	1490			
6	19.5	Ditto	27.9	98.3	125.7	1120			
7	24.5	Ditto	29.2	96.0	124.0	1430			
8	29.5	Stiff tan & gray clay	30.8	92.2	120.6	3915			
9	34.5	Very stiff tan & gray clay	22.6	106.6	130.9	4060			

BORING CB-37

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.	Atterberg Limits LL	PL	PI
1	2.5	Medium stiff brown & gray clay	38.3	81.3	112.4	1180	64	23	41
2	5.5	Stiff tan & gray clay	29.2	96.4	124.5	2985	58	21	37
3	8.5	Medium stiff tan & gray silty clay	27.3	97.9	124.6	1890			
4	11.5	Ditto	27.6	97.9	124.9	1650			
5	14.5	Stiff tan & gray clay	24.6	102.4	127.6	2370			
6	18.0	Ditto	21.7	107.6	130.9	2275			
7	19.5	Ditto	26.7	99.6	126.2	2725			
8	22.0	Ditto	26.9	98.1	124.5	2695			
9	24.5	Very stiff tan & gray clay	32.5	90.9	120.4	4565			
10	29.5	Ditto	20.7	108.8	131.3	7255			
11	34.5	Ditto	23.2	103.0	126.9	5405			
12	39.5	Stiff tan & gray fissured clay	36.8	84.5	115.6	2575			
13	42.0	Ditto	39.0	82.0	114.0	2200			
14	44.5	Medium stiff tan & gray clay w/silt layers	30.9	94.2	123.3	1045			
16	54.5	Stiff tan & gray fissured clay	31.9	95.6	126.1	3165			

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Incorporated
Louisiana Plant
Union, St. James Parish, Louisiana

For: Bechtel Corporation, San Francisco, California

SUMMARY OF LABORATORY TEST RESULTS

BORING PB-1

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lbs./Cu.Ft. Dry	Density Lbs./Cu.Ft. Wet	Unconfined Compressive Strength Lbs./Sq.Ft.
2	5.5	Medium stiff gray & tan clay w/trace of organic matter	40.3	81.5	114.3	1345
4	11.5	Medium stiff tan & gray silty clay	31.1	93.2	122.2	1040
6	19.5	Very stiff tan & gray clay	25.5	101.1	126.9	4005
8	29.5	Ditto	26.0	100.7	126.9	4545
		BORING PB-2				
1	2.5	Medium stiff gray & tan clay	42.4	78.8	112.2	1845
3	8.5	Ditto	37.1	84.9	116.4	1200
5	14.5	Soft gray & tan silty clay	34.6	88.7	119.4	775
7	24.5	Very stiff tan & gray clay	22.2	104.9	128.2	4600
9	34.5	Stiff tan & gray fissured clay	37.5	84.4	116.1	2830
		BORING PB-3				
1	2.5	Stiff gray & tan clay w/silt lenses	30.8	92.7	121.3	2635
3	8.5	Stiff tan & gray clay	33.2	90.5	120.5	2010
5	14.5	Soft tan & gray silty clay	29.2	95.1	122.9	625
7	24.5	Very stiff tan & gray clay	25.4	100.7	126.3	4920
9	34.5	Very stiff tan & gray silty clay	20.2	107.6	129.3	5420
		BORING PB-4				
2	5.5	Medium stiff gray & tan clay	48.7	73.9	109.9	1510
4	11.5	Soft tan & gray silty clay	29.9	93.8	121.8	720
6	19.5	Very stiff tan & gray clay	25.7	101.1	127.1	4500
8	29.5	Ditto	26.1	99.6	125.6	4900
		BORING PB-5				
1	2.5	Stiff gray & tan clay	43.4	78.8	113.0	2105
3	8.5	Stiff gray & tan clay w/silt pockets	25.3	100.2	125.6	3140
5	14.5	Soft tan & gray silty clay	32.1	91.7	121.1	625
7	24.5	Stiff tan & gray clay	34.2	88.4	118.6	2730
9	34.5	Medium stiff tan & gray fissured clay	33.1	89.2	118.7	1660

EUSTIS ENGINEERING COMPANY

Subsoil Investigation
Texaco Inc.
Refinery Expansion
Phase II
Increased Sour Crude Facilities
Convent, Louisiana

For: Pullman Kellogg, Houston, Texas

SUMMARY OF LABORATORY TEST RESULTS

BORING 124

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft
1	2.0	Stiff brown & gray clay w/trace of organic matter & roots	28.0	91.1	116.6	3980
2	5.0	Stiff tan & gray clay with large clayey silt pockets	33.8	85.4	114.3	2135**
3	8.0	Stiff tan & gray clay with trace of silt	30.7	92.0	120.2	2575
4	14.0	Medium compact tan & gray clayey silt w/clay pockets	24.4	100.4	124.9	3755**
5	18.0	Medium compact tan & gray clayey silt w/small concretions	26.6	98.7	124.9	Ø=7° c=[illegible]***
6	23.0	Stiff tan & gray clay w/silt pockets	22.8	104.[illegible]	127.6	34[illegible]
8	28.0	Very stiff tan & gray clay	24.0	101.9	123.3	63[illegible]
10	38.0	Very stiff tan & gray fissured clay	27.0	97.3	123.6	42[illegible]
12	48.0	Stiff tan & gray fissured clay	41.5	79.6	112.7	(*)15[illegible]

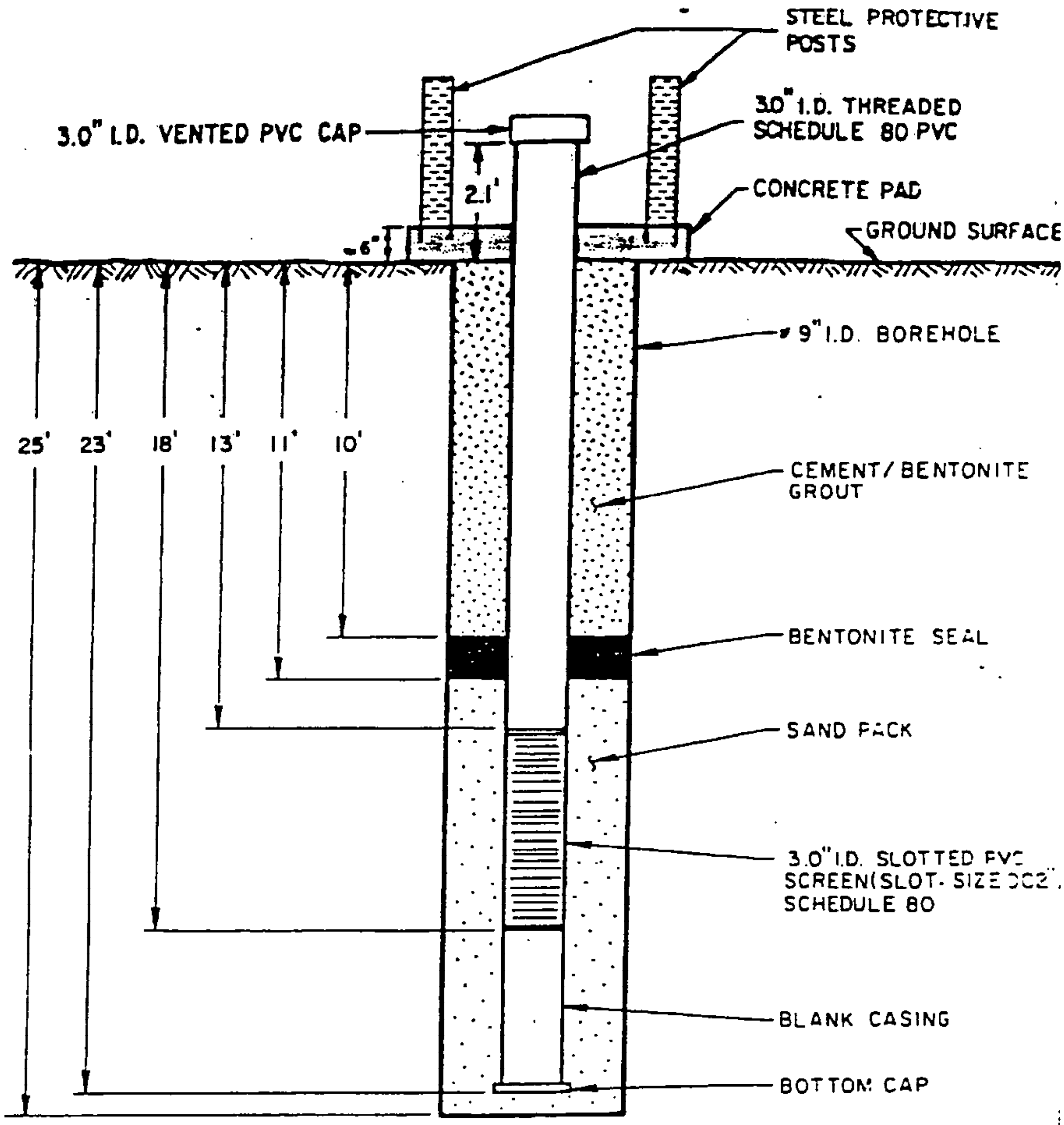
BORING 125

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft
1	2.0	Stiff tan & gray clay w/thick clayey silt layers	24.2	92.3	114.7	25[illegible]
2	5.0	Stiff tan & gray clay w/silty clay layers	27.9	91.2	116.6	39[illegible]
3	8.0	Medium stiff tan & gray fissured clay w/silt pockets	40.5	77.1	108.3	14[illegible]
4	11.0	Soft tan & gray fissured clay	40.9	80.3	113.2	9[illegible]
5	14.0	Soft tan & gray fissured clay w/large silty clay pockets	30.5	89.5	116.8	76[illegible]
6	18.0	Soft gray & tan clay with concretions	41.9	79.8	113.2	61[illegible]
7	24.0	Very stiff tan & gray silty clay w/clayey silt pockets	21.5	105.9	128.7	401[illegible]
8	28.0	Stiff tan & gray clay w/silt pockets	26.3	97.5	123.1	2525
10	38.0	Stiff tan & gray fissured clay	37.4	84.1	115.6	342[illegible]
12	48.0	Stiff tan & gray fissured clay w/silt pockets	35.3	84.4	114.2	2395

*Failed on a fissure.
**Unconsolidated-Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.
***Unconsolidated-Undrained Triaxial Compression Test - Multiple Stage; Ø = Angle of internal friction, c = Cohesion in lb/sq ft.

APPENDIX J

MONITORING WELL CROSS SECTIONS



DRAWING NUMBER SW81-915-A

DRAWN BY DRS 8-30-83

CHECKED BY

APPROVED BY

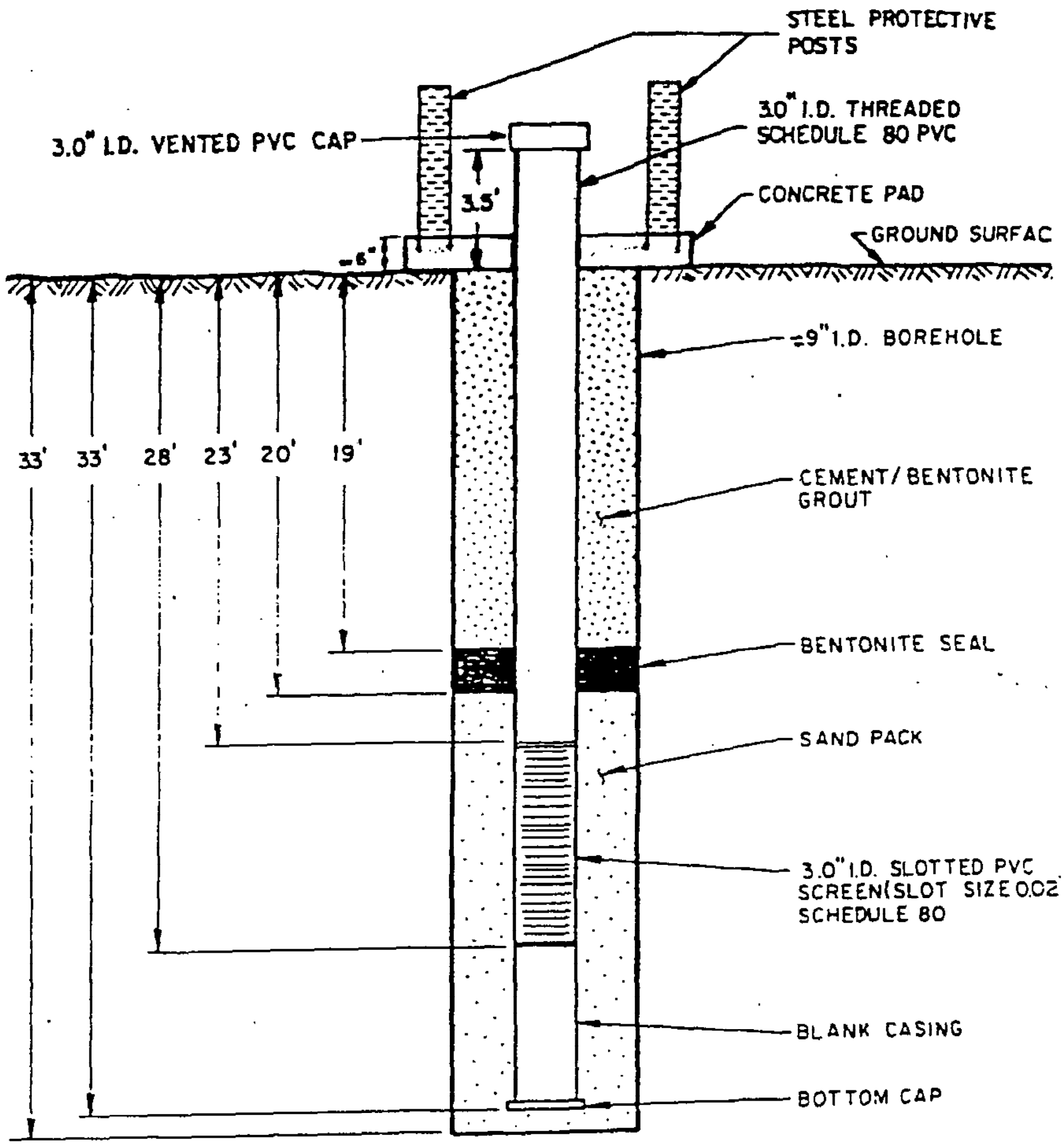
MONITOR WELL SW-1
CONSTRUCTION DETAILS

PREPARED FOR

TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA



DRAWN BY DRS 8-30-83 | CHECKED BY | APPROVED BY | DRAWING NUMBER SW81-915-A

MONITOR WELL SW-2

CONSTRUCTION DETAILS

PREPARED FOR

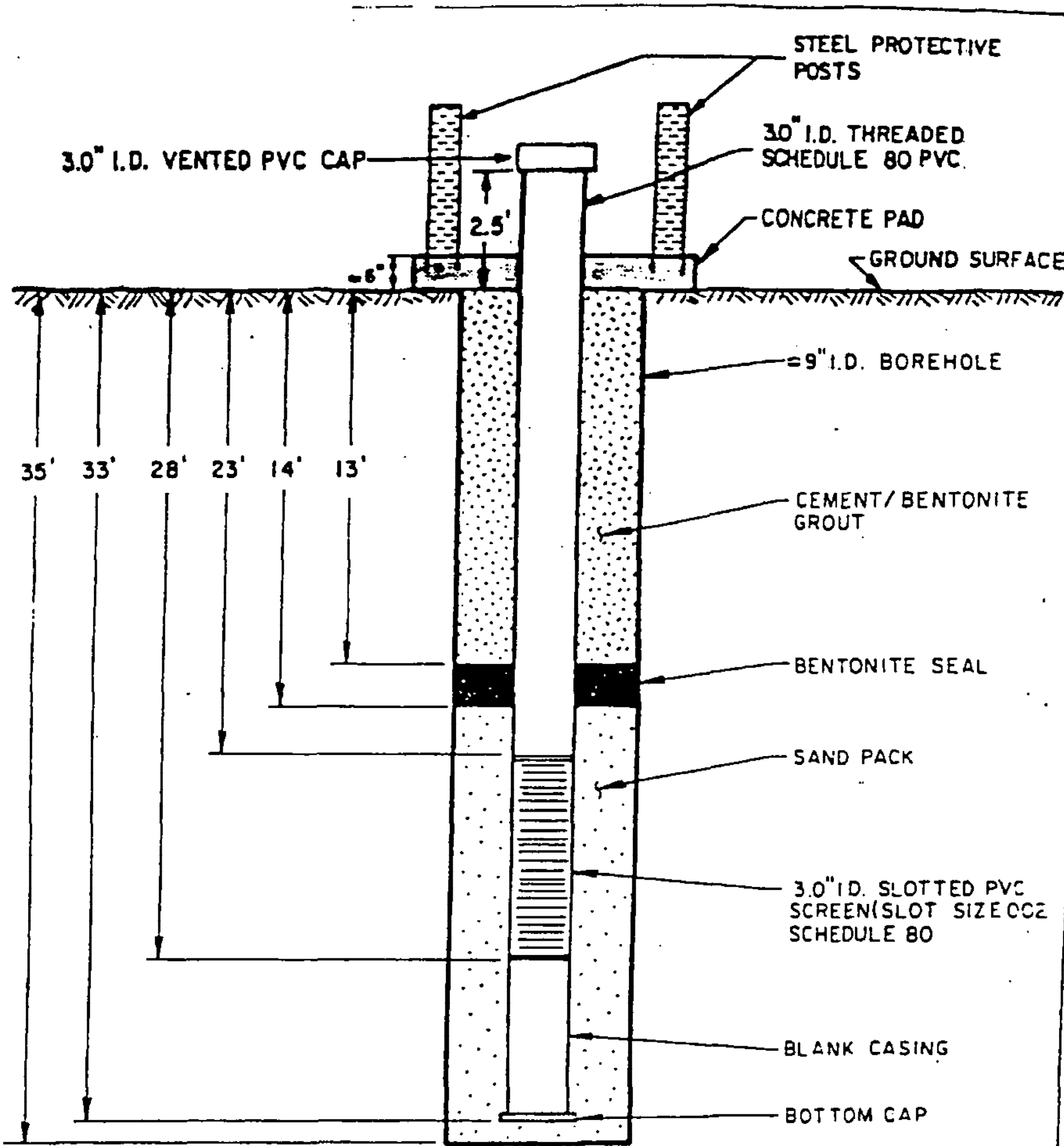
TEXACO U.S.A.

CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWN BY DRS 8-30-83
CHECKED BY SJU
APPROVED BY RWC
DRAWING NUMBER SW81-915-A



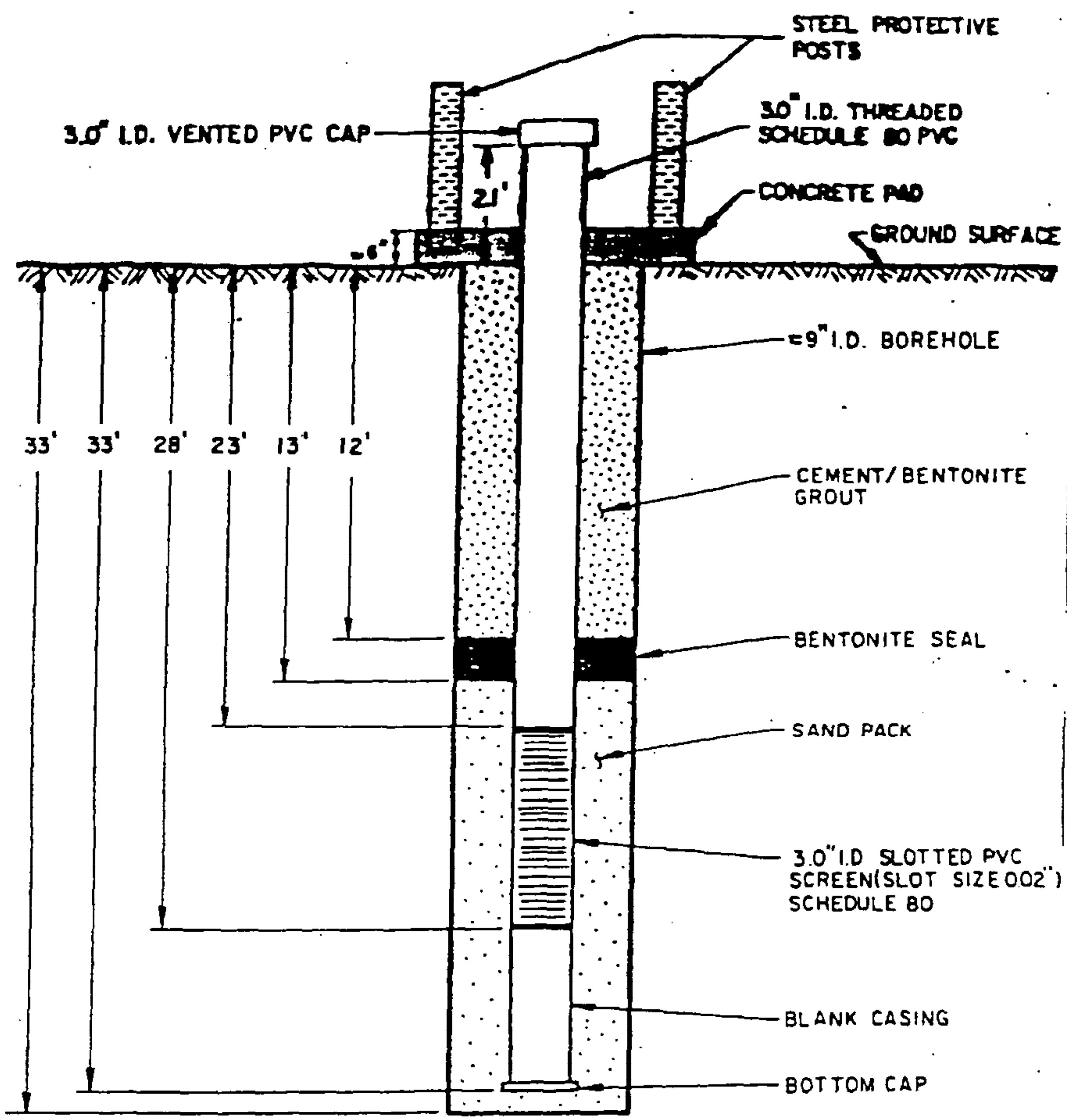
MONITOR WELL SW-3
CONSTRUCTION DETAILS

PREPARED FOR
TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWN BY	DRS 8-30-83
CHECKED BY	
APPROVED BY	
DRAWING NUMBER	SW81-915-A



MONITOR WELL SW-4

CONSTRUCTION DETAILS

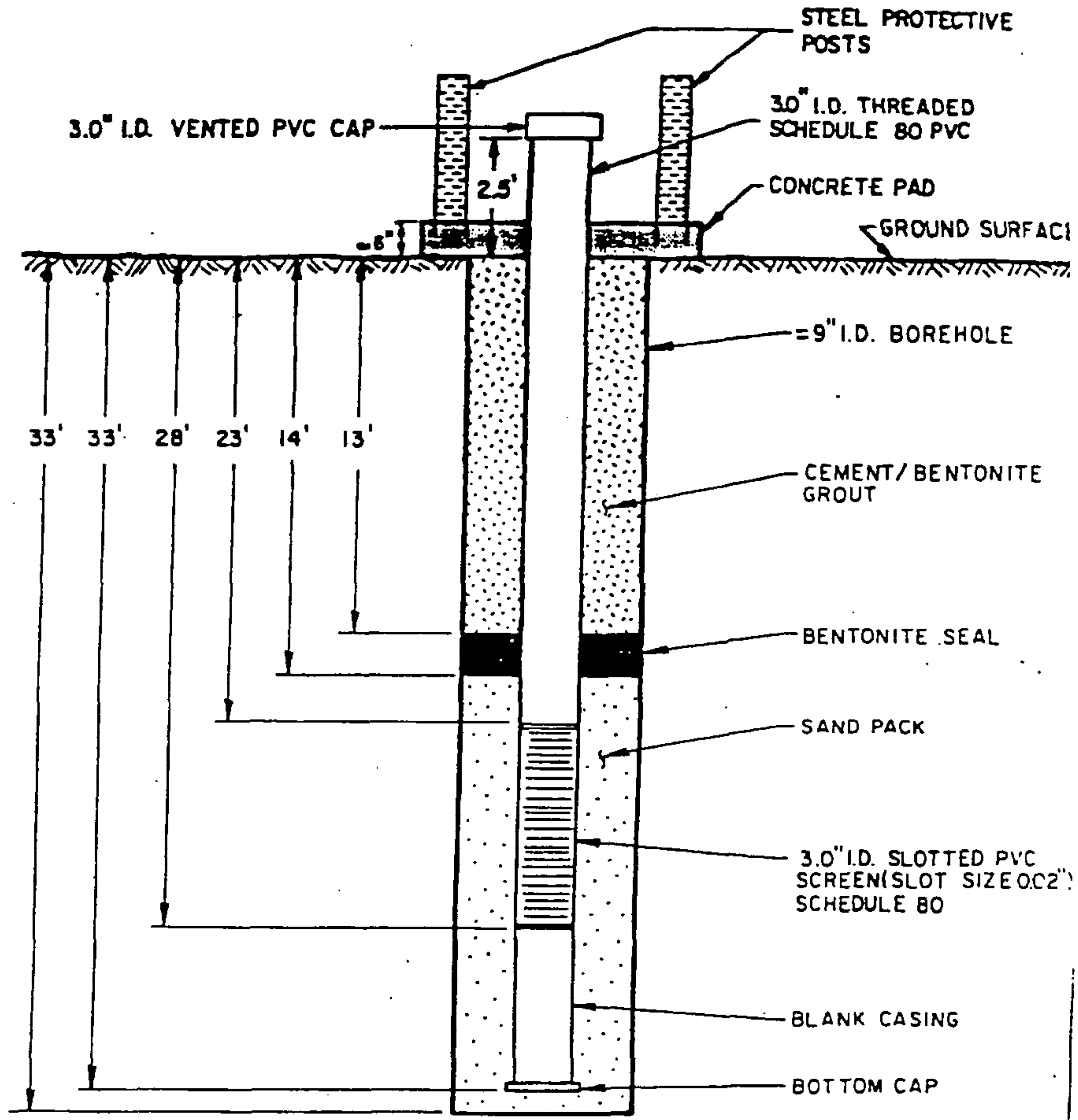
PREPARED FOR

TEXACO U.S.A.

CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA



DRAWING NUMBER SW81-915-A

DRAWN BY DRS 8-30-83

CHECKED BY

APPROVED BY

MONITOR WELL SW-5

CONSTRUCTION DETAILS

PREPARED FOR

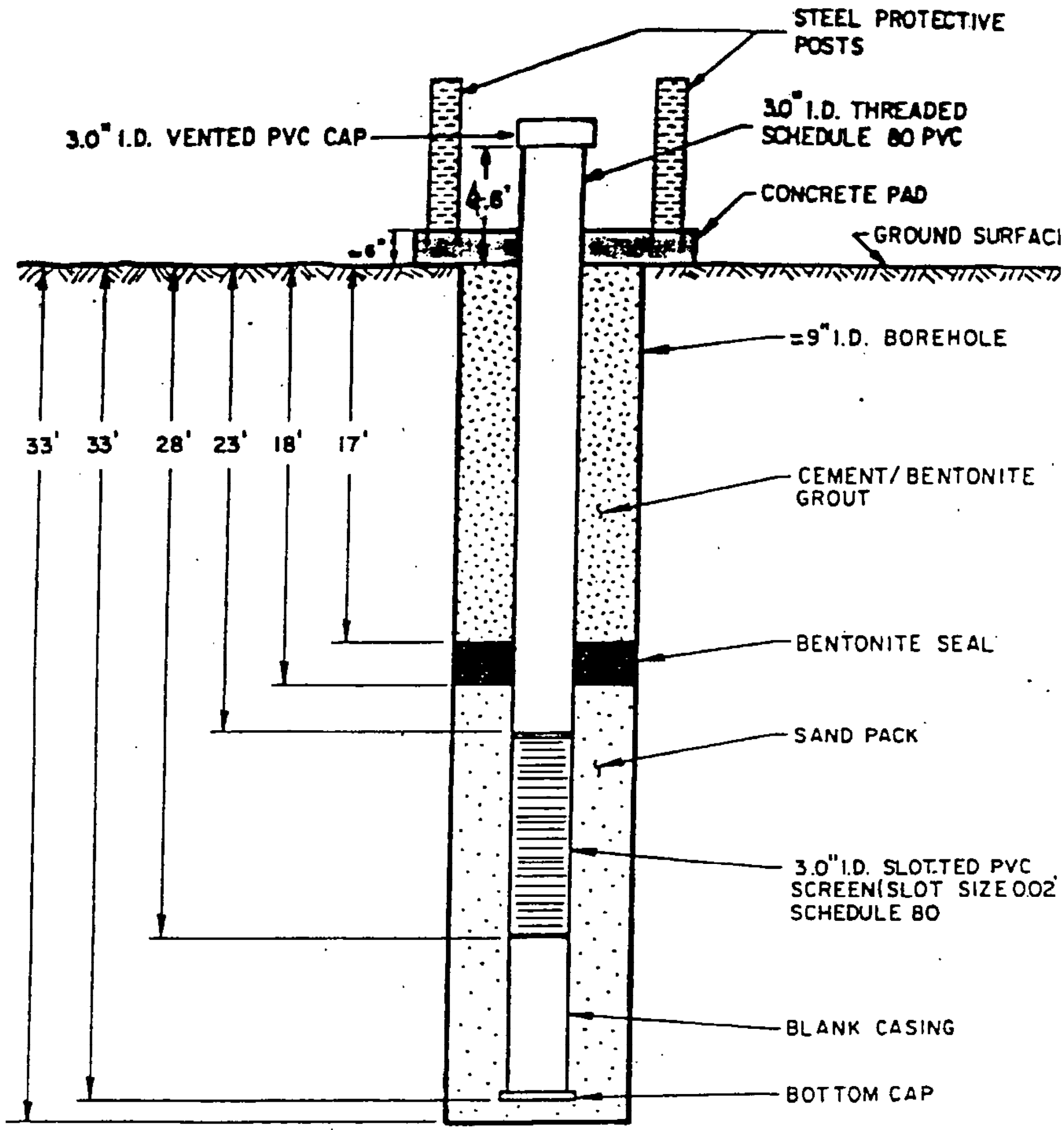
TEXACO U.S.A.

CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWN BY DRS 8-30-83 | CHECKED BY | APPROVED BY | DRAWING NUMBER SW81-915-A



MONITOR WELL SW-6
CONSTRUCTION DETAILS

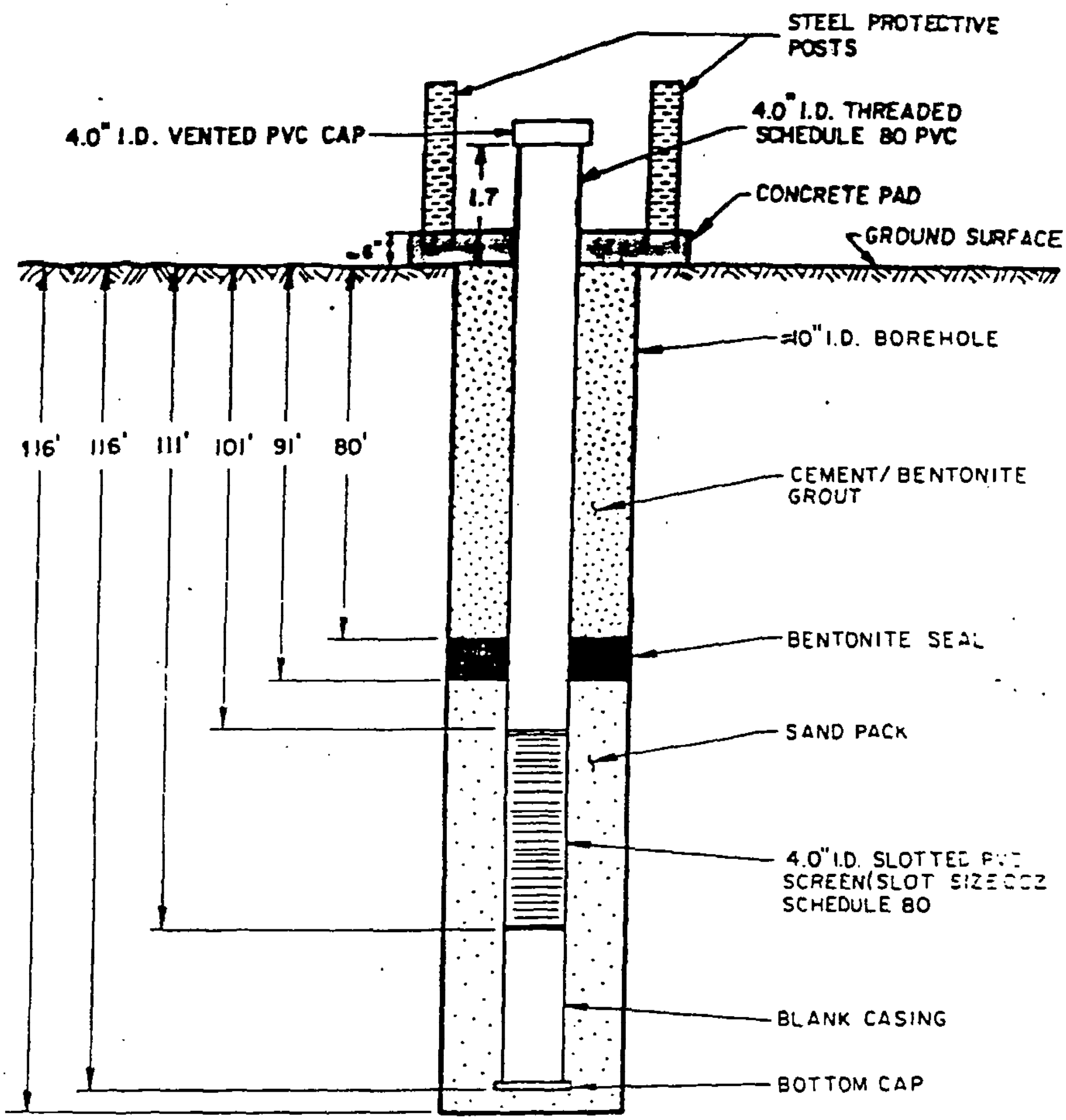
PREPARED FOR
TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWING NUMBER SW81-915-A

DRAWN BY	DRS	8-30-83
CHECKED BY		
APPROVED BY		9-13-83



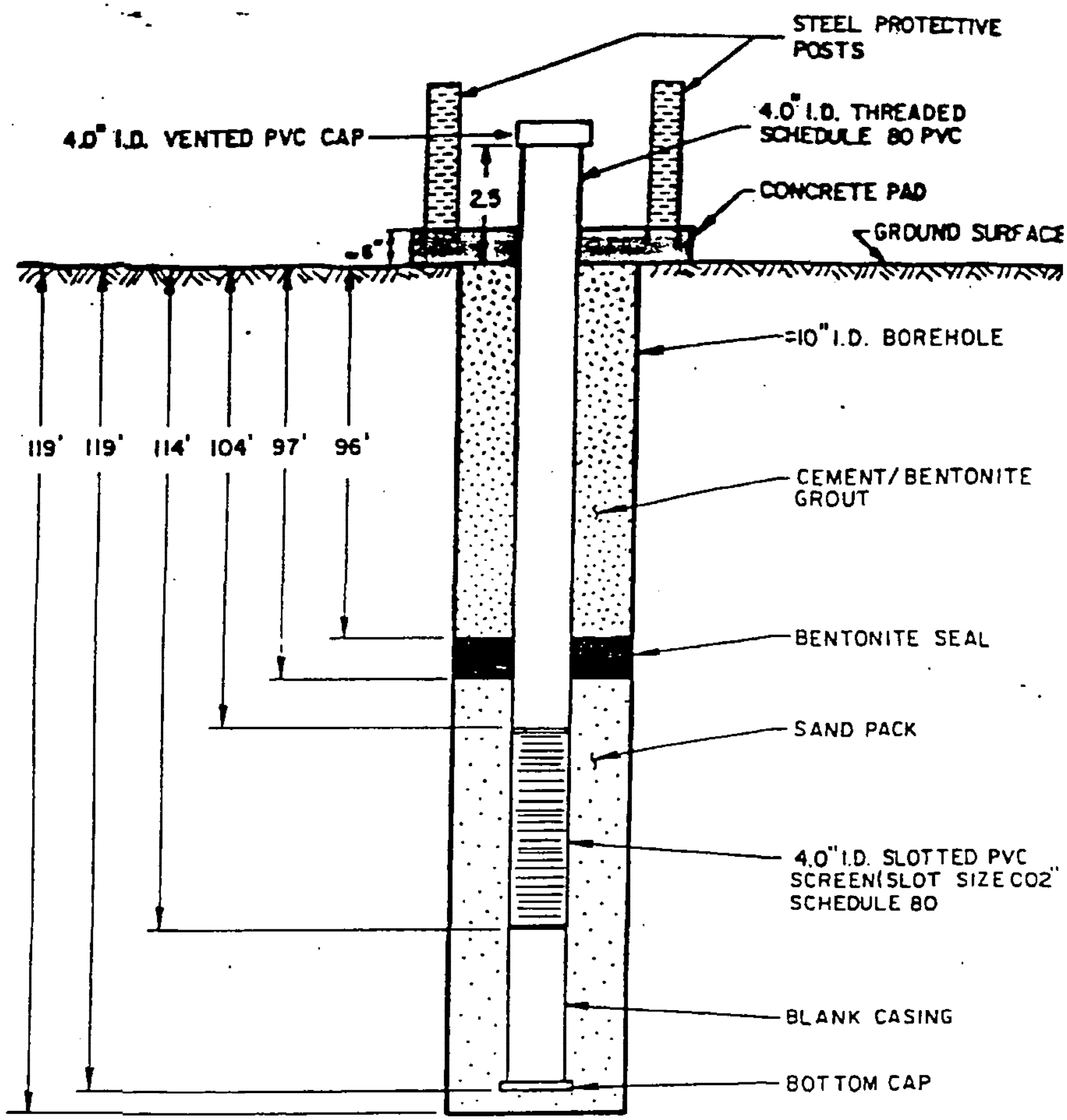
MONITOR WELL MW-1
CONSTRUCTION DETAILS

PREPARED FOR
TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWN BY	DRS 8-30-83	CHECKED BY	APPROVED BY	DRAWING NUMBER SW81-915-A



MONITOR WELL MW-2
CONSTRUCTION DETAILS

PREPARED FOR

TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

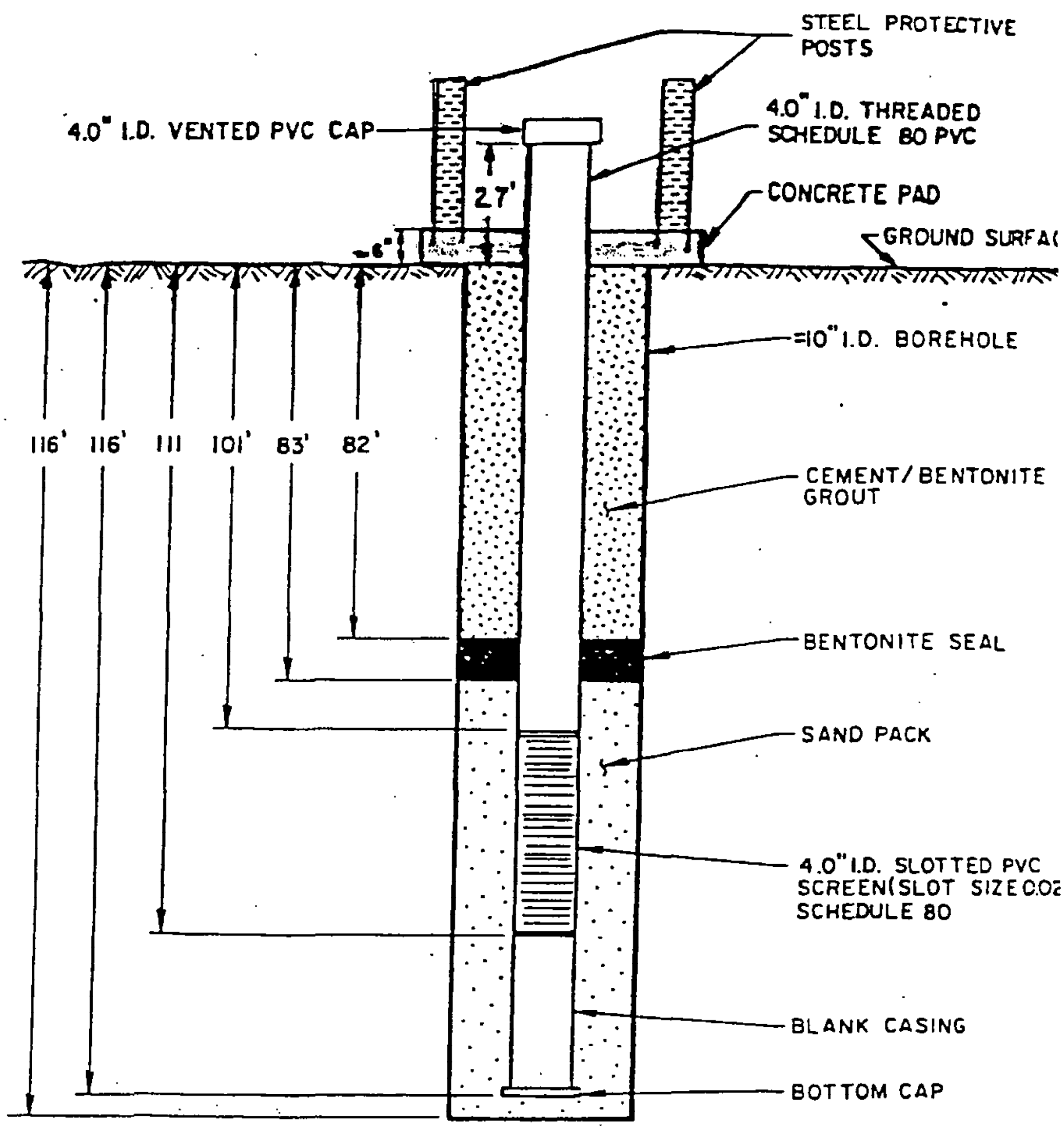
D'APPOLONIA

DRAWING NUMBER SWBI-915-A

DRAWN BY DRS 8-30-83

CHECKED BY

APPROVED BY



MONITOR WELL MW-3

CONSTRUCTION DETAILS

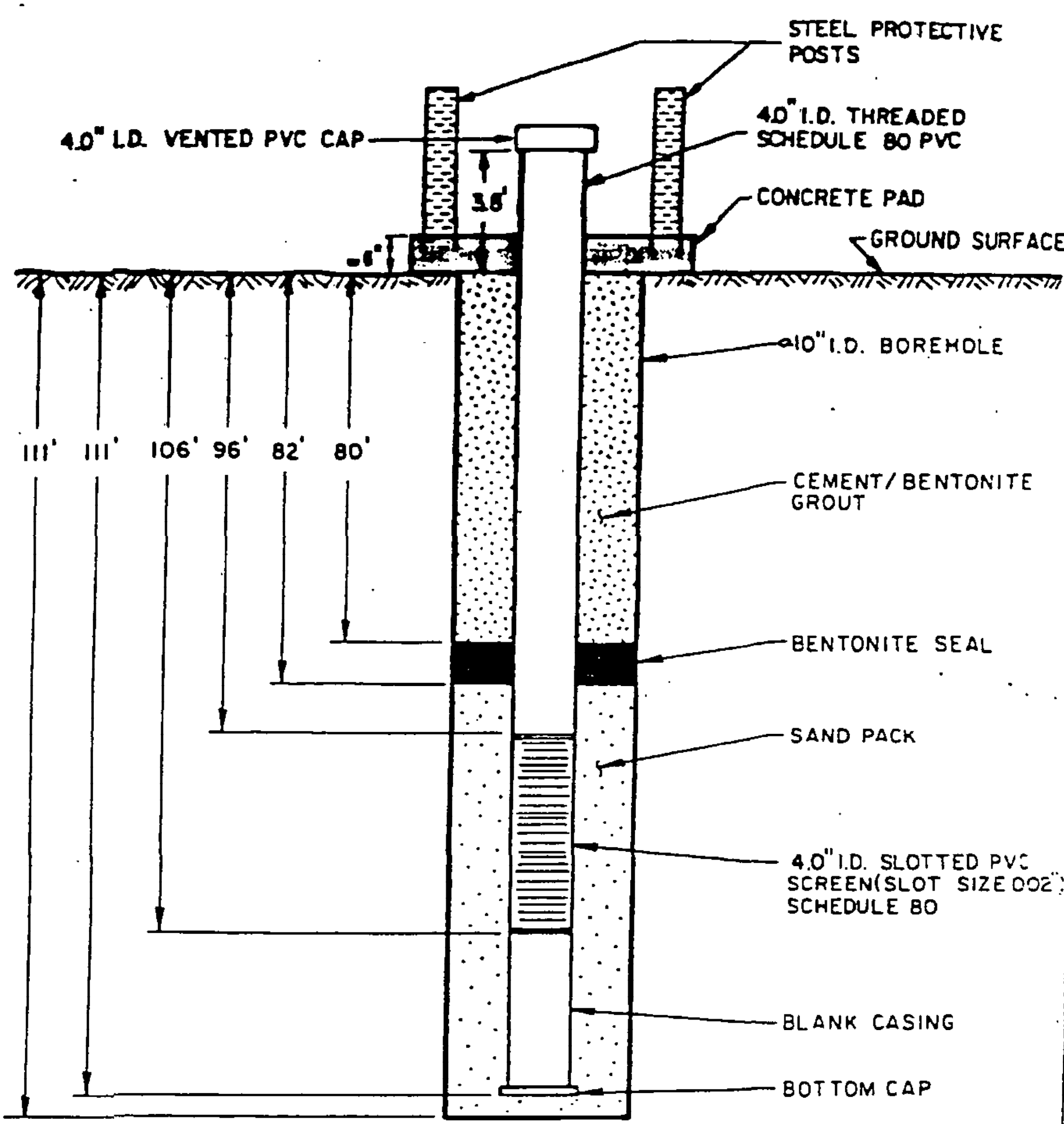
PREPARED FOR

TEXACO U.S.A.

CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA



DRAWN BY: DRS 8-30-83

CHECKED BY

APPROVED BY

DRAWING NUMBER: SWBI-915-A

MONITOR WELL MW-4
CONSTRUCTION DETAILS

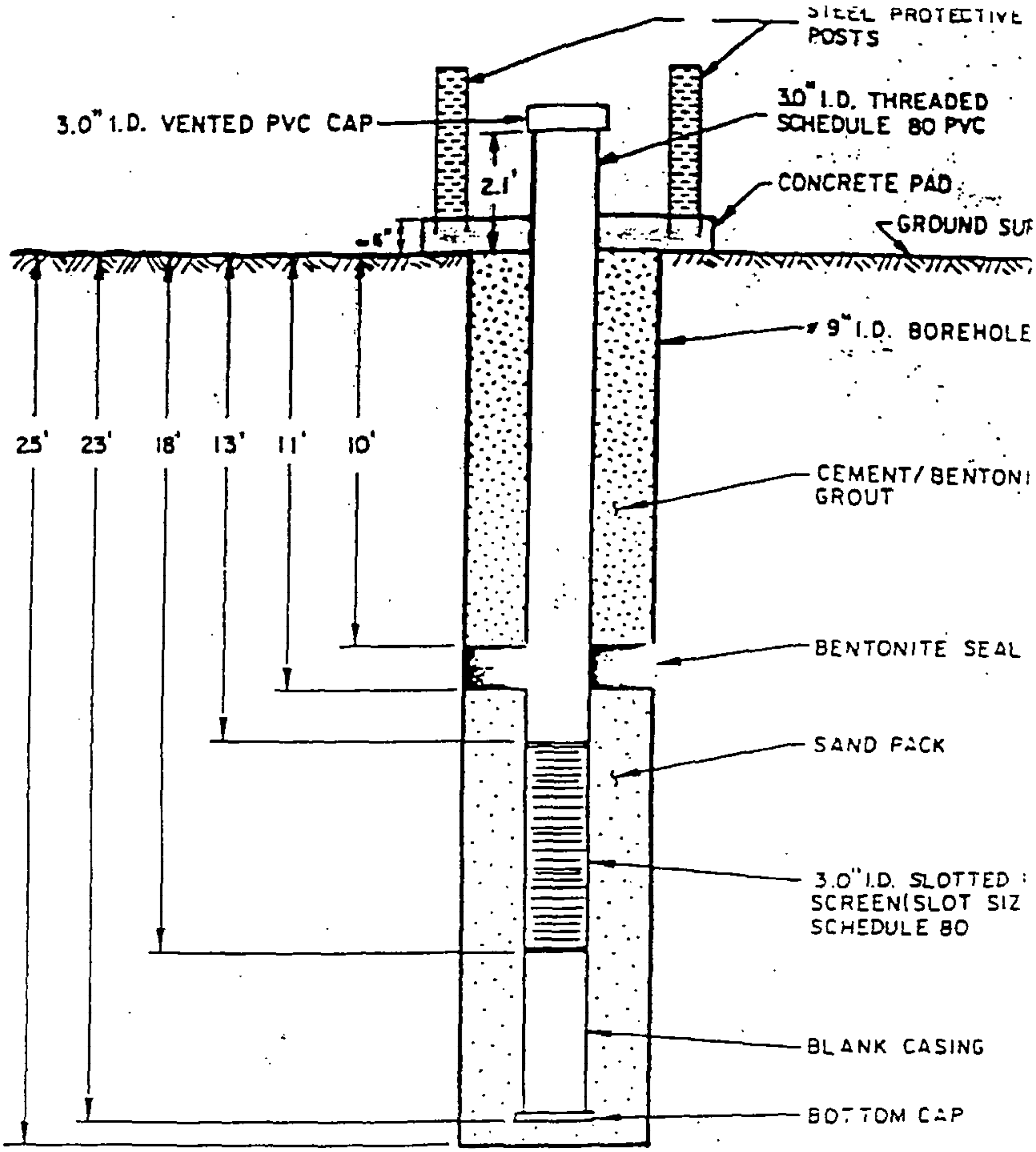
PREPARED FOR

TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWN BY DRS 8-30-83
CHECKED BY
APPROVED BY
DRAWING NUMBER SW81-915-A

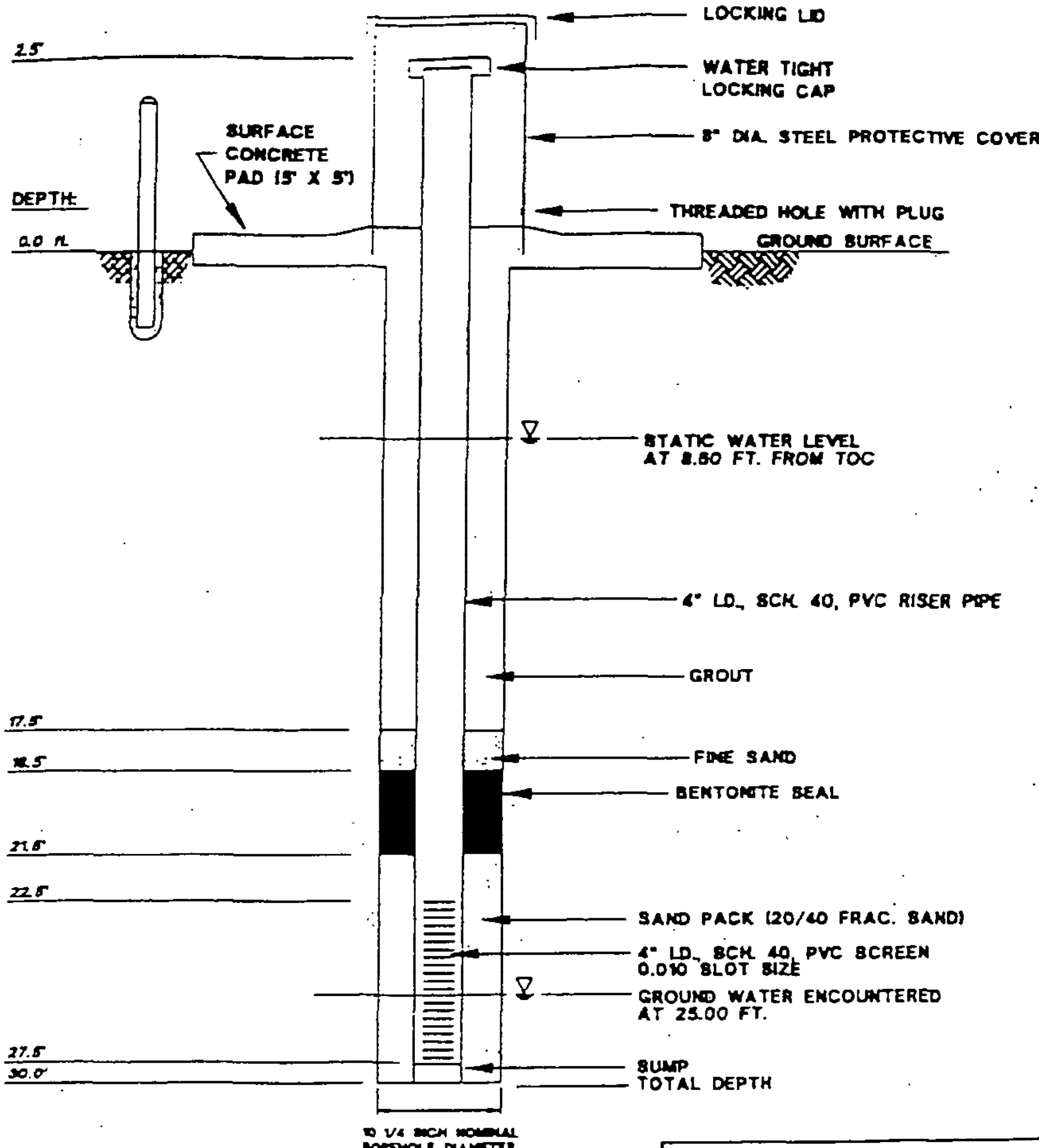


MONITOR WELL SW-1
CONSTRUCTION DETAILS

PREPARED FOR
TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA



NOT TO SCALE

Job/Phase/Task No.: 647-0012

Well No.: SW-2R

Date Installed: 7/02/98

Elevation Top of Casing: 13.59 FEET NVGD

LADOTD WELL NO.:

LAT: 30° 07' 02.608" LONG: 90° 53' 38.913"

PLANT NORTH: 4107.55 PLANT EAST: 8324.38

WELL CONSTRUCTION DIAGRAM

STAR ENTERPRISE
SW-2R
CONVENT, LOUISIANA

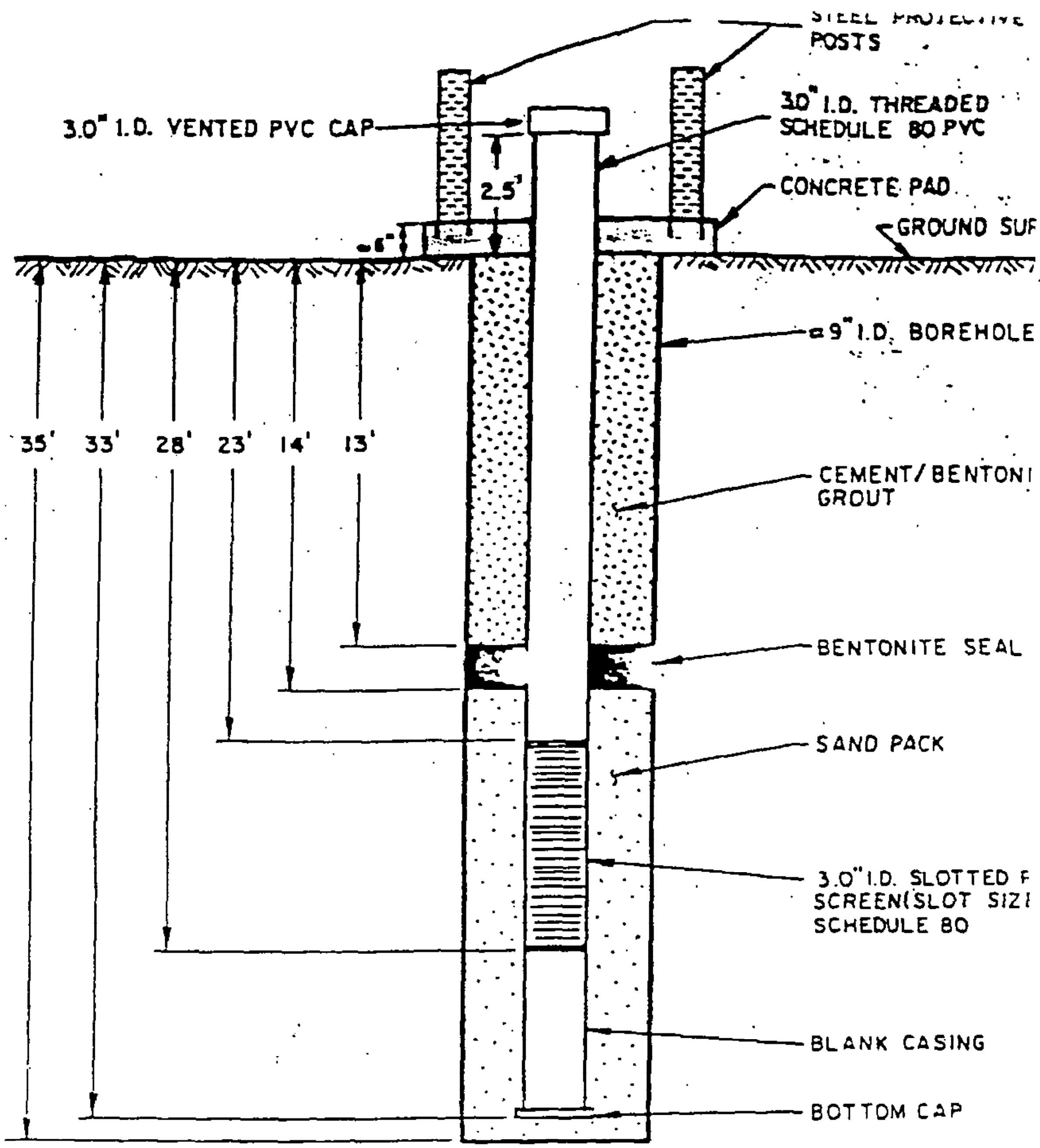
PREPARED FOR

STAR ENTERPRISE
CONVENT, LOUISIANA

SEMS, Inc.

DRAWN BY	LDG	CHECKED BY		DRAWING #
	7/27/98	APPROVED BY		647-A30

DRAWN BY DRS 8-30-83 | CHECKED BY SJD | APPROVED BY JWC | DRAWING NUMBER SW81-915-A



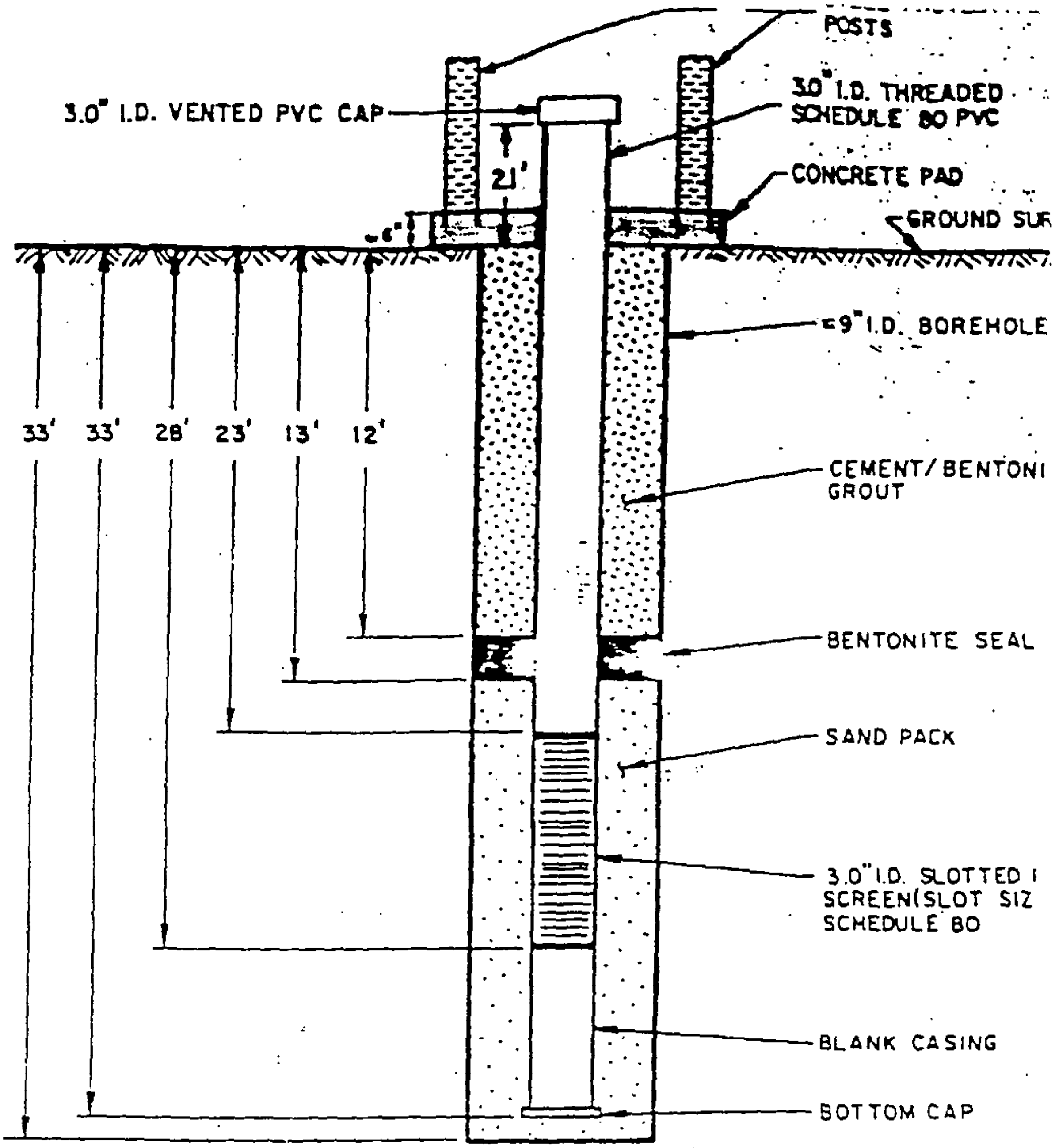
MONITOR WELL SW-3
CONSTRUCTION DETAILS

PREPARED FOR
TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONI

DRAWN BY	DRS	CHECKED BY		DRAWING NUMBER
	8-30-83	APPROVED BY	9-21-83	SW81-915-A



MONITOR WELL SW-1

CONSTRUCTION DETAILS

PREPARED FOR

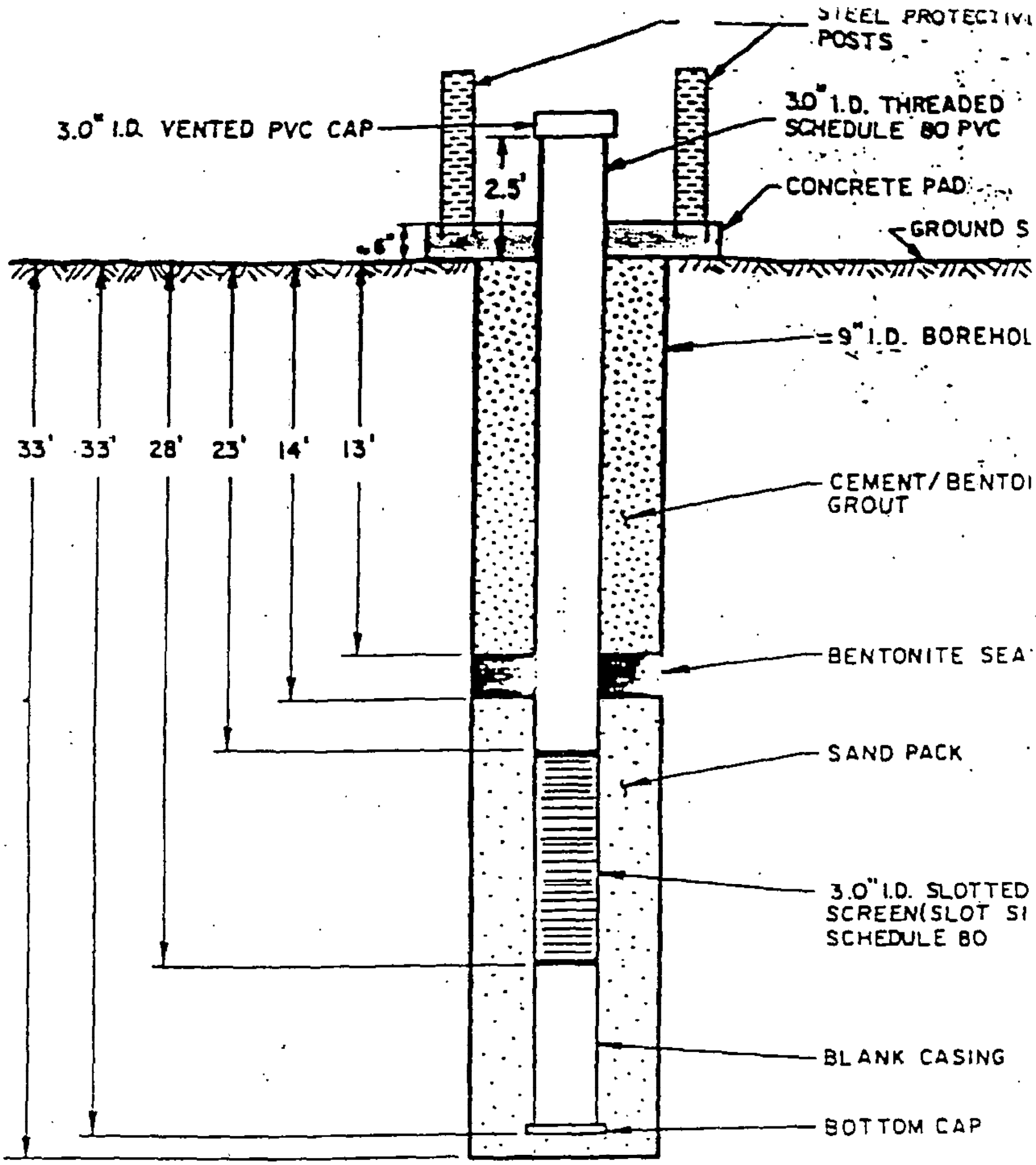
TEXACO U.S.A.

CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

DRAWN BY ORS 6-30-83
CHECKED BY
APPROVED BY
DRAWING NUMBER SW81-915-A

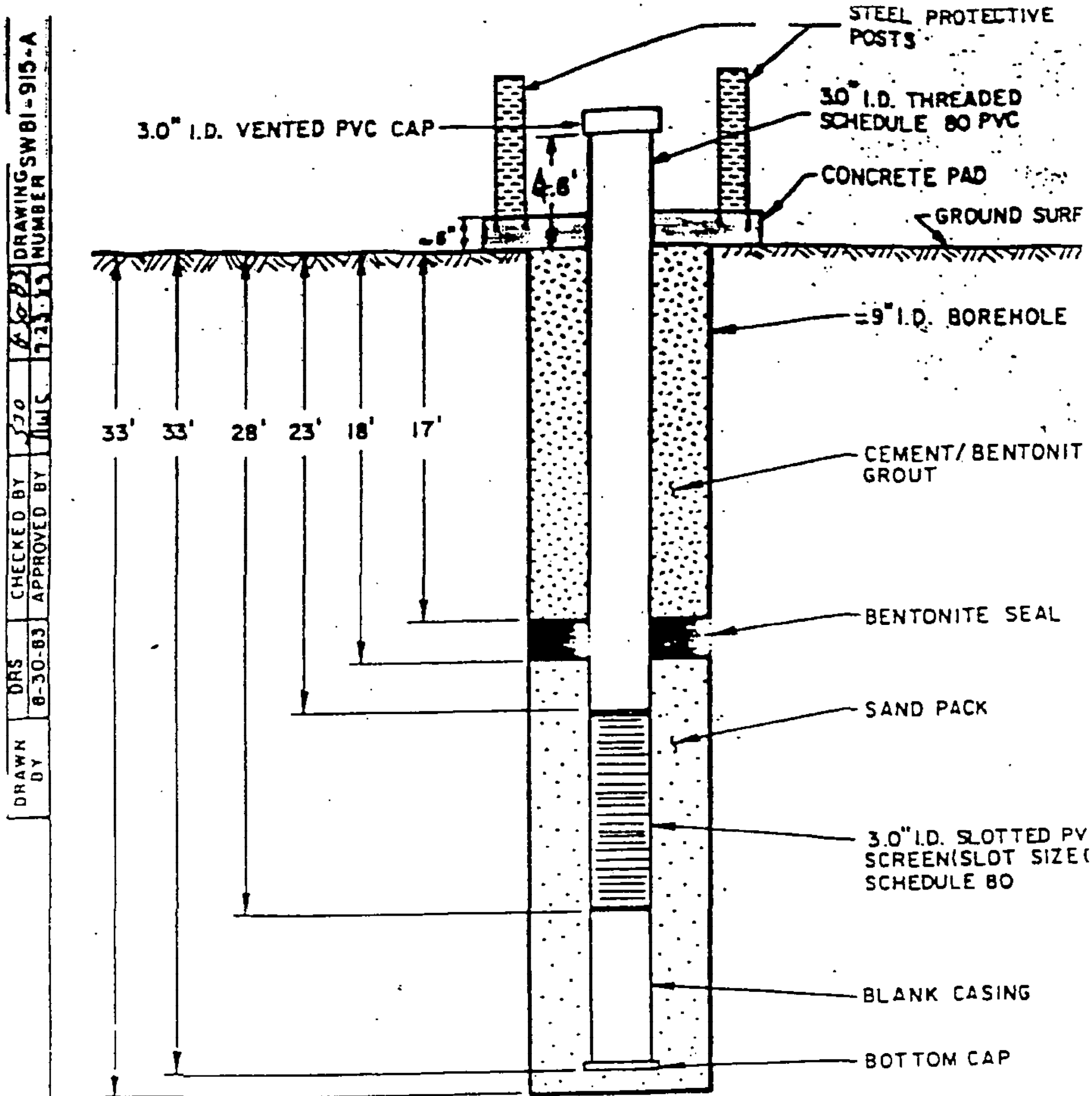


MONITOR WELL SW-5
CONSTRUCTION DETAILS

PREPARED FOR
TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLON



MONITOR WELL SW-6
CONSTRUCTION DETAILS

PREPARED FOR

TEXACO U.S.A.
CONVENT, LOUISIANA

DRAWING NOT TO SCALE

D'APPOLONIA

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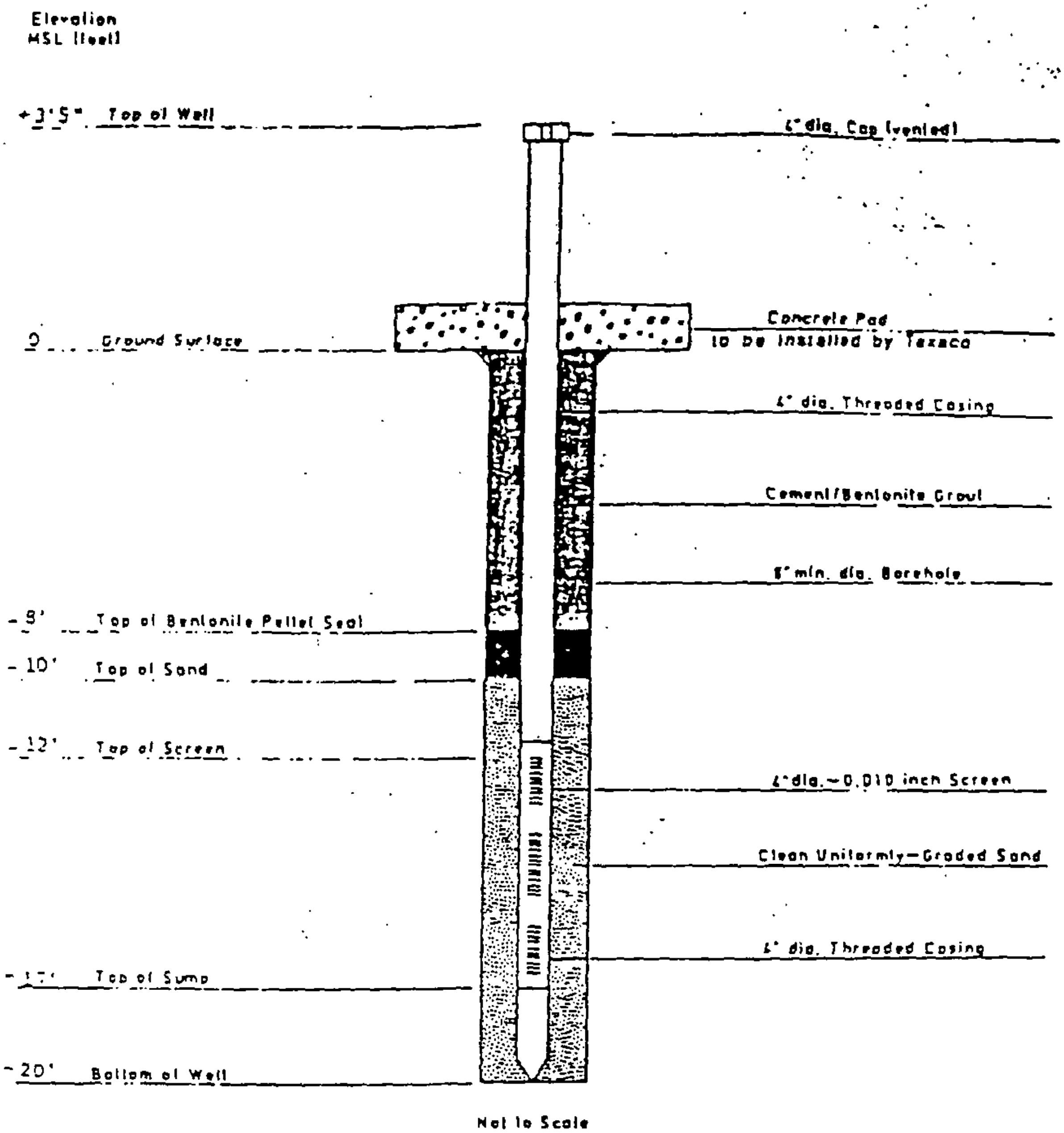
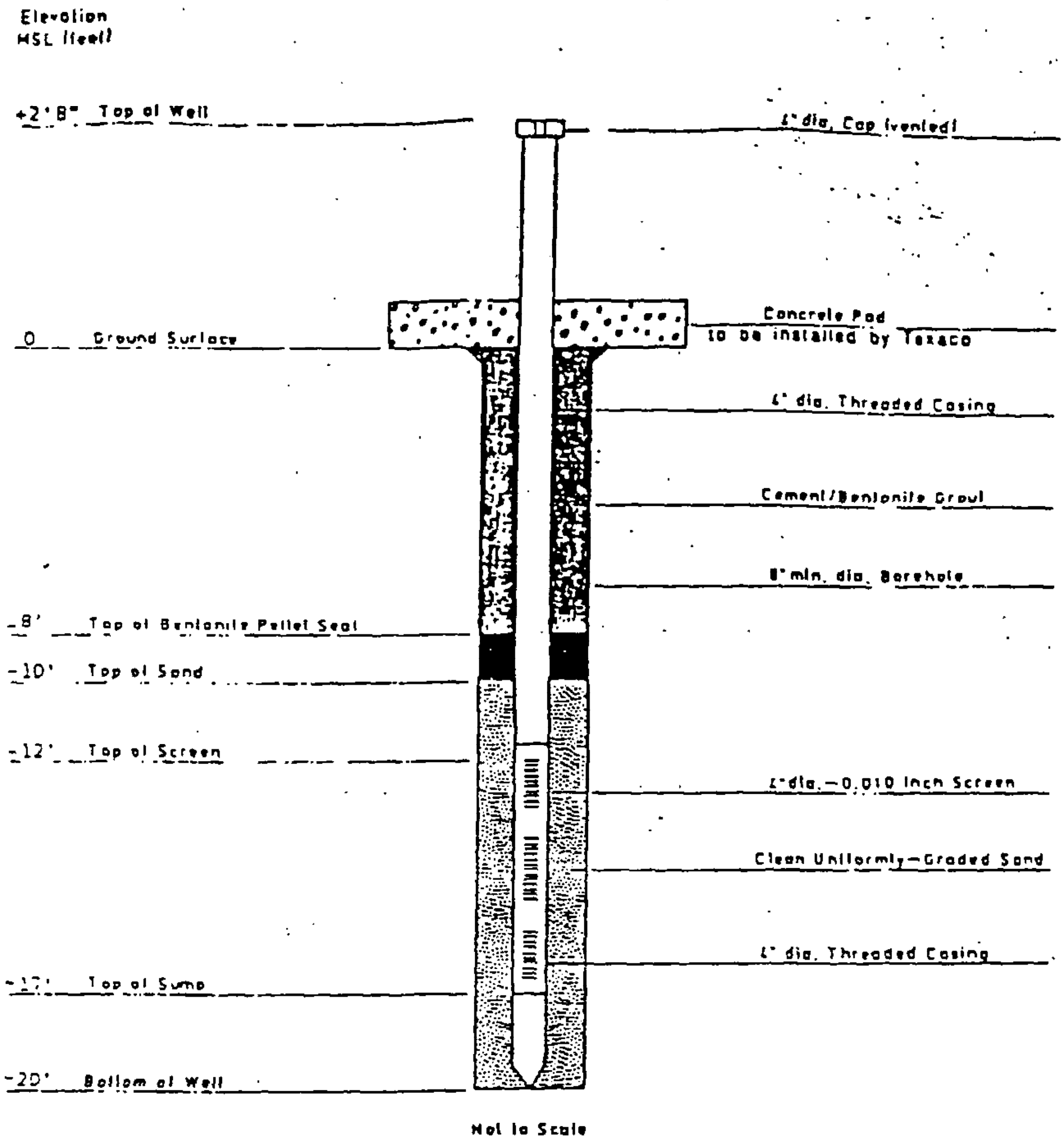


MONITOR WELL SW-7

SOIL TESTING ENGINEERS, INC.

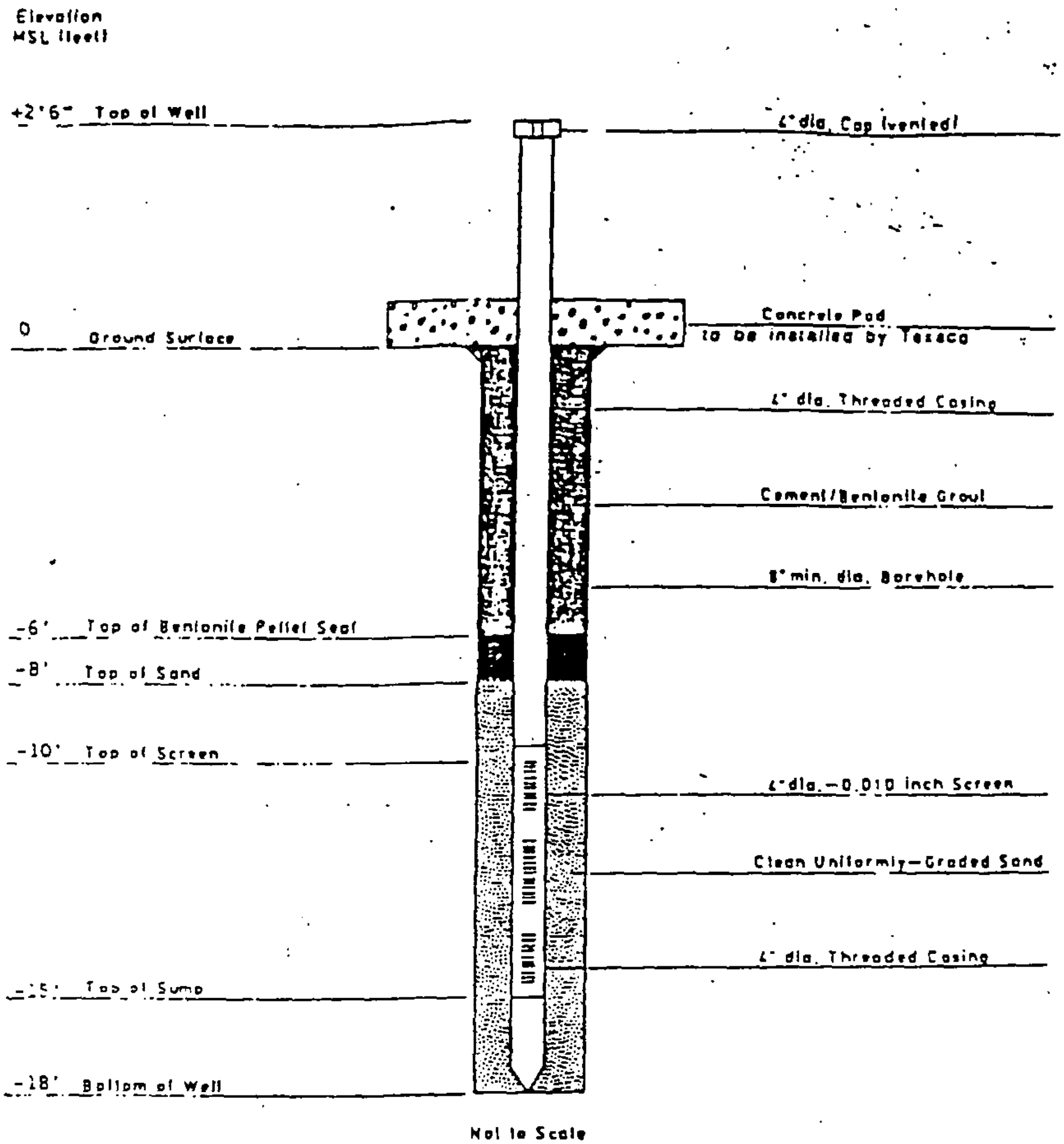
FIGURE



MONITOR WELL SW-8

SOIL TESTING ENGINEERS, INC.

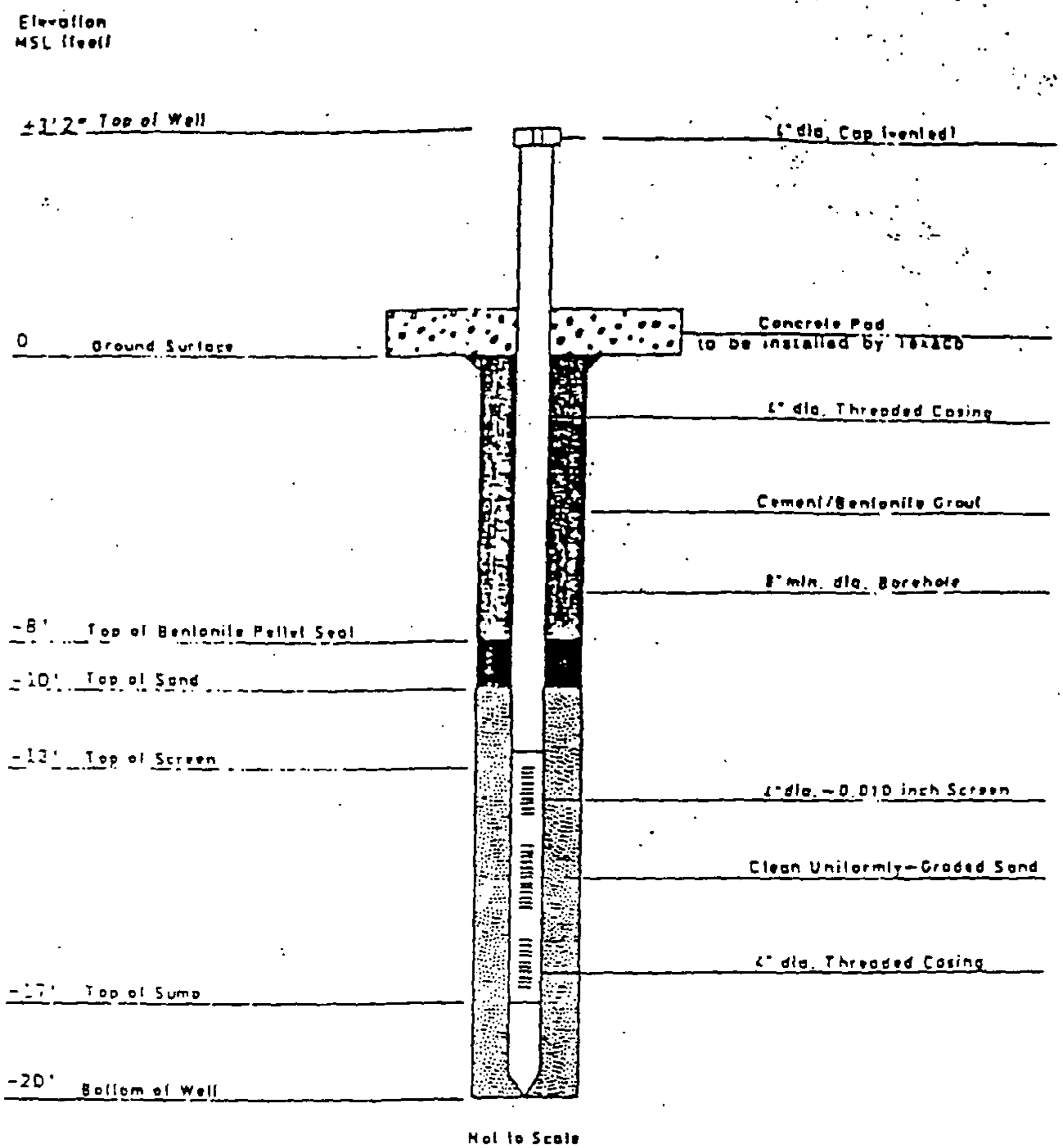
FIGUR



MONITOR WELL SW-9

SOIL TESTING ENGINEERS, INC.

FIGUR



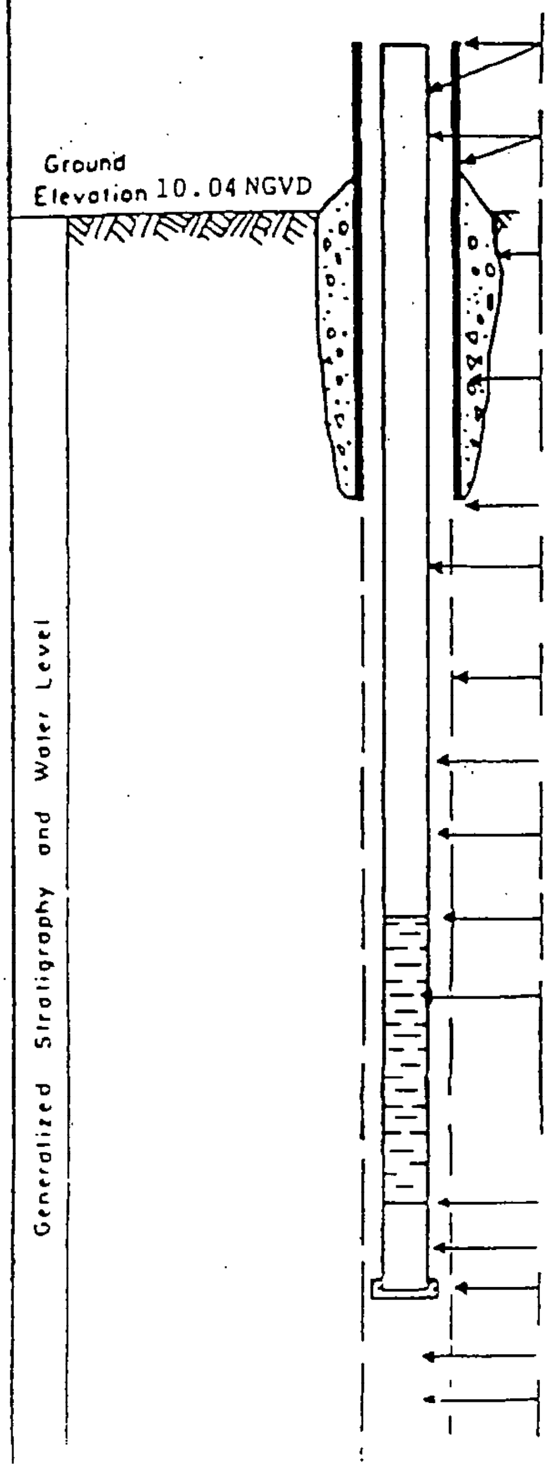
MONITOR WELL SW-10

SOIL TESTING ENGINEERS, INC.

FIGU

GROUND WATER OBSERVATION WELL REPORT

PROJECT Landfarm Shallow GW Quality Investigation		Page 1 of 1
LOCATION Star Enterprise Louisiana Plant, Convent, LA		Well No. SW-11
Date Completed 6-21-90	Original Depth 9'	Aquifer Shallow
Inspected By B. Morris	Date 6-21-90	Water Table Zone
Checked By D. Lowe	Date 7-03-90	Depth Interval



Elevation of top of surface casing / riser pipe.	/13.44
Height of top of surface casing / riser pipe above ground surface	/3.4'
Depth of surface seal below ground surface	
Type of surface seal:	
I.D of surface casing.	
Type of surface casing:	
Depth of surface casing below ground	
I. D. of riser pipe.	4"
Type of riser pipe: 4" Sch. 40 PVC	
Diameter of borehole	10"
Depth of borehole	9'
Type of backfill: Cement/Bent. Grout	
Elev./depth top of seal.	/3.5'
Type of seal: 100% Bent. Pellets	
Elev./depth bottom of seal.	/4.5'
Type of sand pack. 20-40 Col. Sand	
Depth of top of sand pack.	/4.5'
Elev./depth top of screened section.	/5.0'
Type of screened section: 4" Sch. 40 PVC	
Describe openings Horizontal 0.010 inch slots	
I.D. of screened section.	4"
Elev./depth bottom of screened section	+0.04/9'
Length of blank section	0
Elev./depth bottom of plugged blank section	+0.04/9'
Elev./depth bottom of sand column	+0.04/9'
Type of backfill below observation pipe None	
Elev./depth of hole	+0.04/9'

GROUND WATER OBSERVATION WELL REPORT

PROJECT: Landfarm Shallow GW Quality Investigation

LOCATION: Star Enterprise Louisiana Plant, Convent, LA

Date Completed: 6-19-90 Original Depth: 10.0

Inspected By: B. Morris Date: 6-19-90

Checked By: D. Lowe Date: 7-03-90

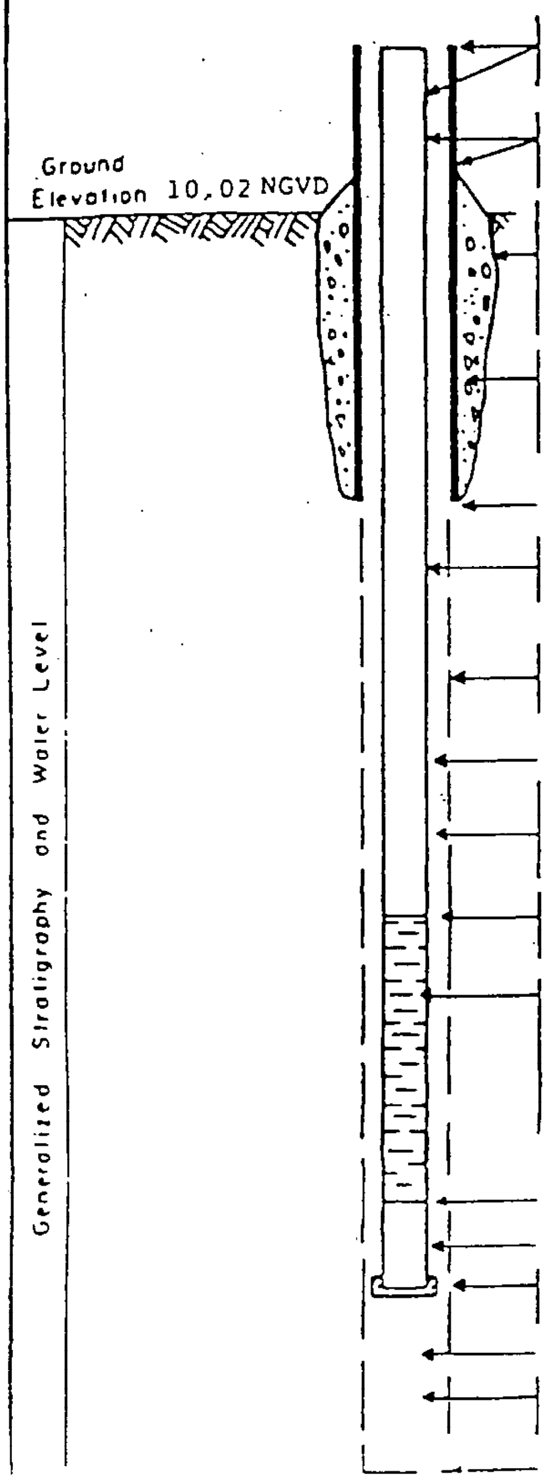
Page 1 of 1

Well No. SW-12

Aquifer: Shallow

Water Table Zone

Depth Interval:



Elevation of top of surface casing / riser pipe.	/13.
Height of top of surface casing / riser pipe above ground surface	/3.4
Depth of surface seal below ground surface	
Type of surface seal:	
I.D of surface casing.	
Type of surface casing:	
Depth of surface casing below ground	
I.D. of riser pipe.	4"
Type of riser pipe: 4" sch. 40 PVC	
Diameter of borehole	10"
Depth of borehole	10.0'
Type of backfill: Cement/Bent. Grout	
Elev./depth top of seal.	+6.52 /3.5'
Type of seal: 100% Bent. Pellets	
Elev./depth bottom of seal.	+5.52 /4.5'
Type of sand pack. 20-40 Col. Sand	
Depth of top of sand pack.	+5.52 /4.5'
Elev./depth top of screened section.	5.02 /5.0'
Type of screened section: 4" Sch. 40 PVC	
Describe openings Horizontal 0.010 inch slots	
I.D. of screened section.	4"
Elev./depth bottom of screened section.	+0.02 /10.0
Length of blank section	0
Elev./depth bottom of plugged blank section	+0.02 /10.0
Elev./depth bottom of sand column	+0.02 /10.0
Type of backfill below observation pipe None	
Elev./depth of hole	+0.02 /10.0

GROUND WATER OBSERVATION WELL REPORT

PROJECT Landfarm Shallow GW Quality Investigation

LOCATION Star Enterprise Louisiana Plant, Convent, LA

Date Completed 6-21-90 Original Depth 10.0'

Inspected By B. Morris Date 6-21-90

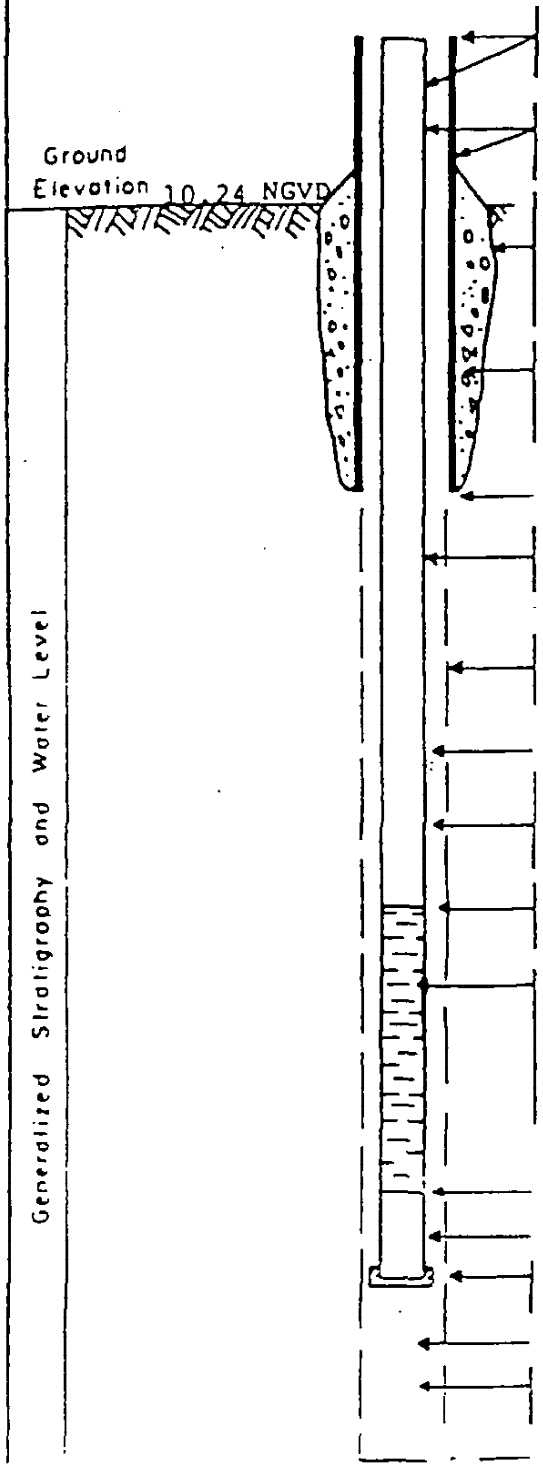
Checked By D. Lowe Date 7-03-90

Page 1 of 1

Well No. SW-13

Aquifer Shallow Water Table Zone

Depth Interval



Elevation of top of surface casing / riser pipe.	/13.6
Height of top of surface casing / riser pipe above ground surface	/3.4'
Depth of surface seal below ground surface	
Type of surface seal:	
I.D of surface casing.	
Type of surface casing:	
Depth of surface casing below ground	
I.D. of riser pipe.	4"
Type of riser pipe: 4" Sch.40 PVC	
Diameter of borehole	10"
Depth of borehole	10.0'
Type of backfill: Cement/Bent. Grout	
Elev./depth top of seal.	+6.74 /3.5
Type of seal: 100% Bent. Pellets	
Elev./depth bottom of seal.	+5.74 /4.5'
Type of sand pack. 20-40 Col Sand	
Depth of top of sand pack.	+5.74 /4.5'
Elev./depth top of screened section.	+5.24 /5.0'
Type of screened section: 4" Sch.40 PVC	
Describe openings Horizontal 0.010 inch slots	
I.D. of screened section.	4"
Elev /depth bottom of screened section.	+0.24 /10.(
Length of blank section	0
Elev./depth bottom of plugged blank section	+0.24 /10.(
Elev /depth bottom of sand column	+0.24 /10.(
Type of backfill below observation pipe None	
Elev /depth of hole	+0.24 /10.(

GROUND WATER OBSERVATION WELL REPORT

PROJECT Landfarm Shallow GW Quality Investigation

LOCATION Star Enterprise Louisiana Plant, Convent, LA

Date Completed 6-21-90 Original Depth 10.0'

Inspected By B. Morris Date 6-21-90

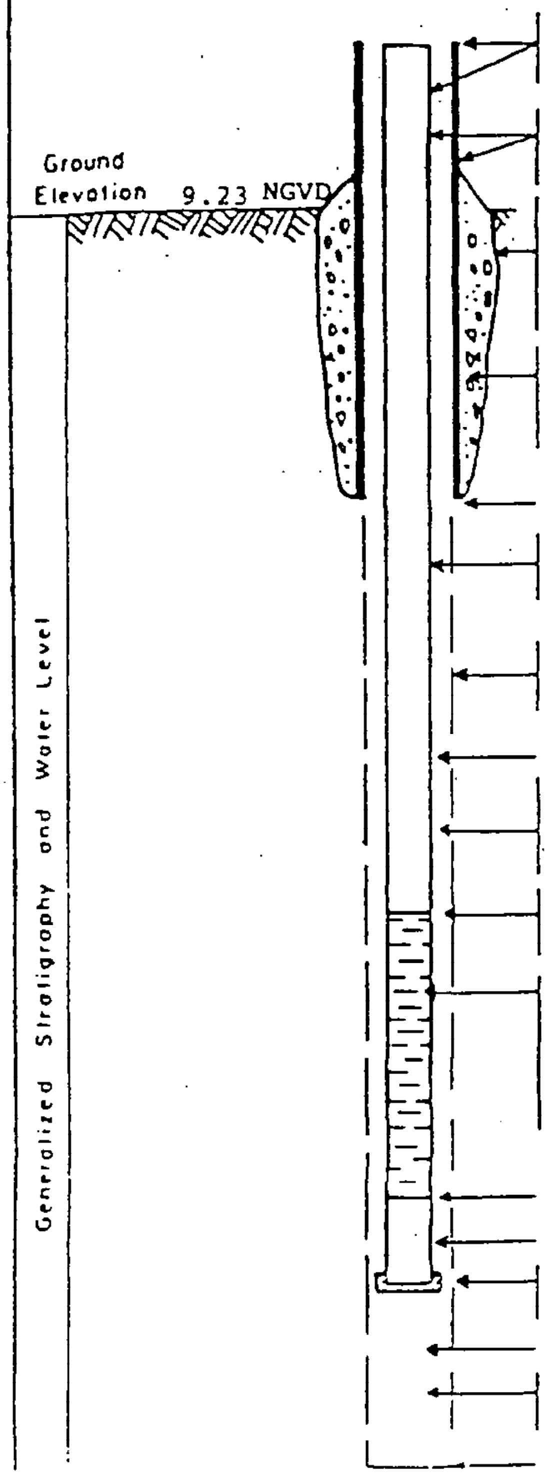
Checked By D. Lowe Date 7-03-90

Page 1 of 1

Well No. SW-14

Aquifer Shallow Water Table Zone

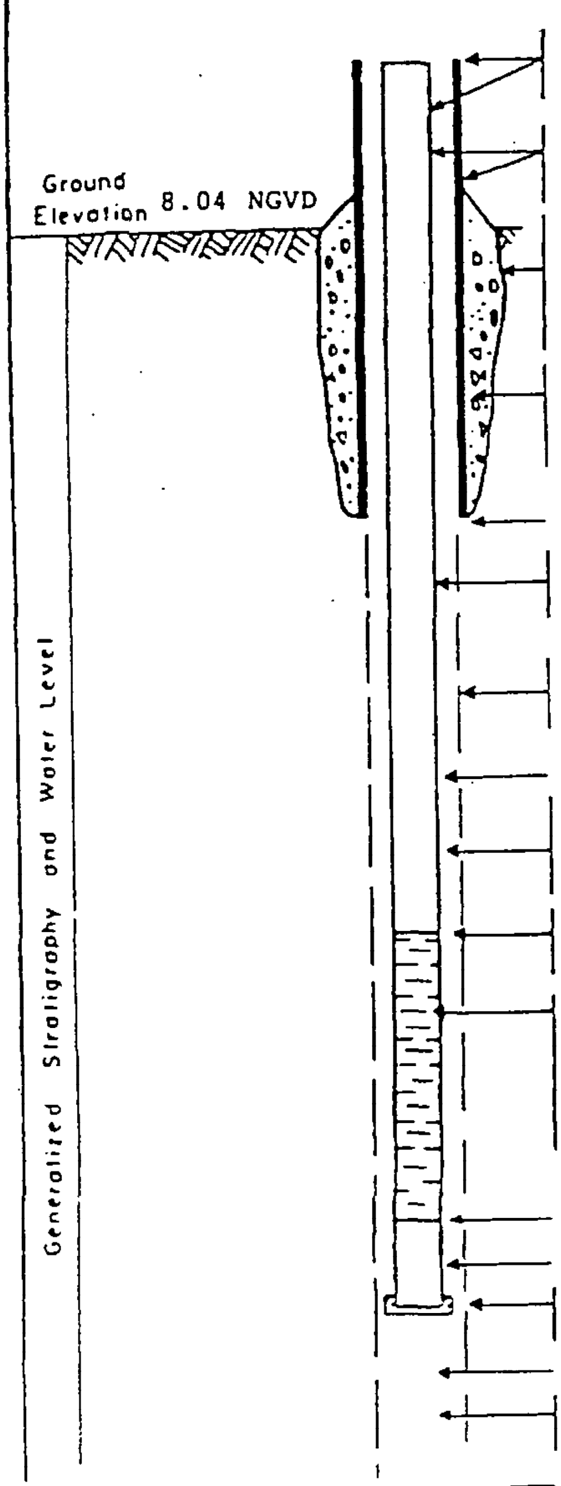
Depth Interval ____



Elevation of top of surface casing / riser pipe.	/12.6
Height of top of surface casing / riser pipe above ground surface	/3.4'
Depth of surface seal below ground surface	
Type of surface seal:	
I.D of surface casing.	
Type of surface casing:	
Depth of surface casing below ground	
I.D. of riser pipe.	4"
Type of riser pipe: 4" Sch.40 PVC	
Diameter of borehole	10"
Depth of borehole	10.0
Type of backfill: Cement/Bent. Grout	
Elev./depth top of seal.	+6.73'/2.5'
Type of seal: 100% Bent. Pellets	
Elev./depth bottom of seal.	+5.73'/3.5'
Type of sand pack. 20-40 COL Sand	
Depth of top of sand pack.	+5.73'/3.5'
Elev./depth top of screened section.	+5.23 /4.0'
Type of screened section: 4" Sch. 40 PVC	
Describe openings Horizontal 0.010 inch slots	
I.D. of screened section.	4"
Elev /depth bottom of screened section.	+0.23/10.0'
Length of blank section	0
Elev / depth bottom of plugged blank section	+0.23/10.0'
Elev / depth bottom of sand column	+0.23/10.0'
Type of backfill below observation pipe None	
Elev / depth of hole	-0.23 /10.0'

GROUND WATER OBSERVATION WELL REPORT

PROJECT Landfarm Shallow GW Quality Investigation	Page 1 of 1
LOCATION Star Enterprise Louisiana Plant, Convent, LA	Well No. SW-1S
Date Completed 6-20-90 Original Depth 8.0'	Aquifer Shallow
Inspected By B. Morris Date 6-20-90	Water Table Zone
Checked By D. Lowe Date 7-03-90	Depth Interval



Elevation of top of surface casing / riser pipe.	/11.4?
Height of top of surface casing / riser pipe above ground surface	/3.4'
Depth of surface seal below ground surface	
Type of surface seal:	
I.D. of surface casing.	
Type of surface casing:	
Depth of surface casing below ground	
I.D. of riser pipe.	4"
Type of riser pipe: 4" Sch. 40 PVC	
Diameter of borehole	10"
Depth of borehole	8'
Type of backfill: Cement/Bent. Grout	
Elev./depth top of seal.	+6.04'/2.0'
Type of seal: 100% Bent. Pellets	
Elev./depth bottom of seal.	+5.04'/3.0'
Type of sand pack. 20-40 Col. Sand	
Depth of top of sand pack.	+5.04'/3.0'
Elev./depth top of screened section.	+5.04'/3.0'
Type of screened section: 4" Sch. 40 PVC	
Describe openings Horizontal 0.010 inch slots	
I.D. of screened section.	4"
Elev./depth bottom of screened section	+0.04/8.0'
Length of blank section	0
Elev./depth bottom of plugged blank section	+0.04/8.0'
Elev./depth bottom of sand column	+0.04/8.0'
Type of backfill below observation pipe None	
Elev./depth of hole	-0.04/8.0'

GROUND WATER OBSERVATION WELL REPORT

PROJECT Landfarm Shallow GW Quality Investigation

LOCATION Star Enterprise Louisiana Plant, Convent, LA

Date Completed 6-20-90 Original Depth 10.5'

Inspected By B. Morris Date 6-20-90

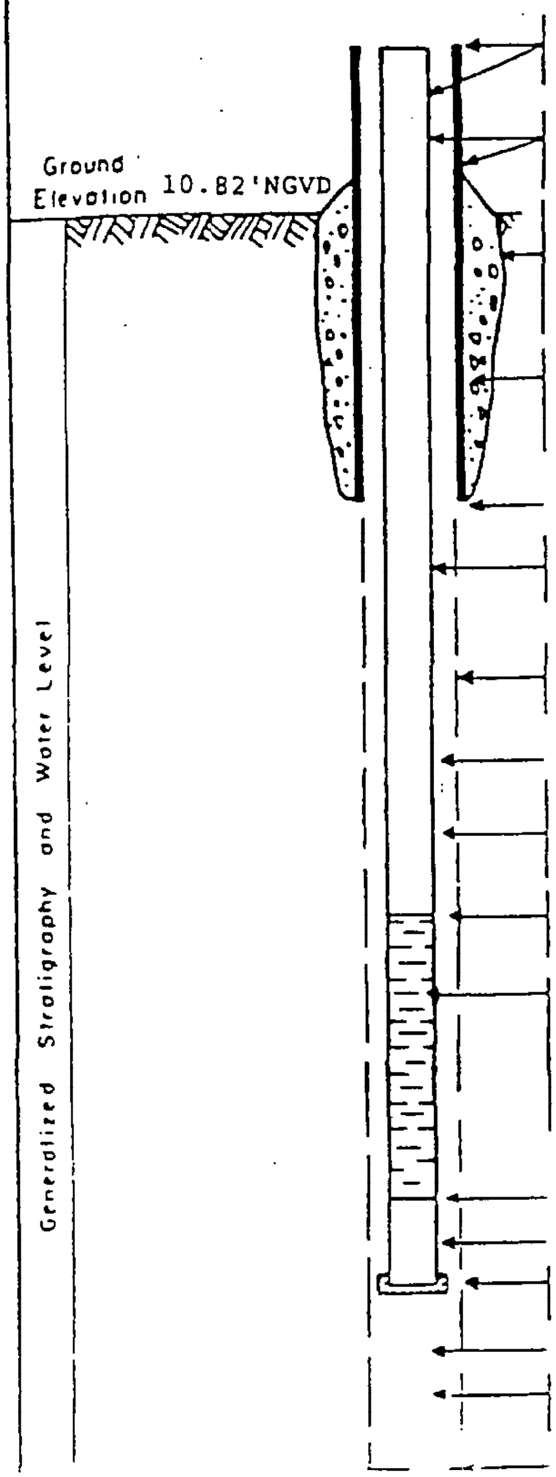
Checked By D. Lowe Date 7-03-90

Page 1 of 1

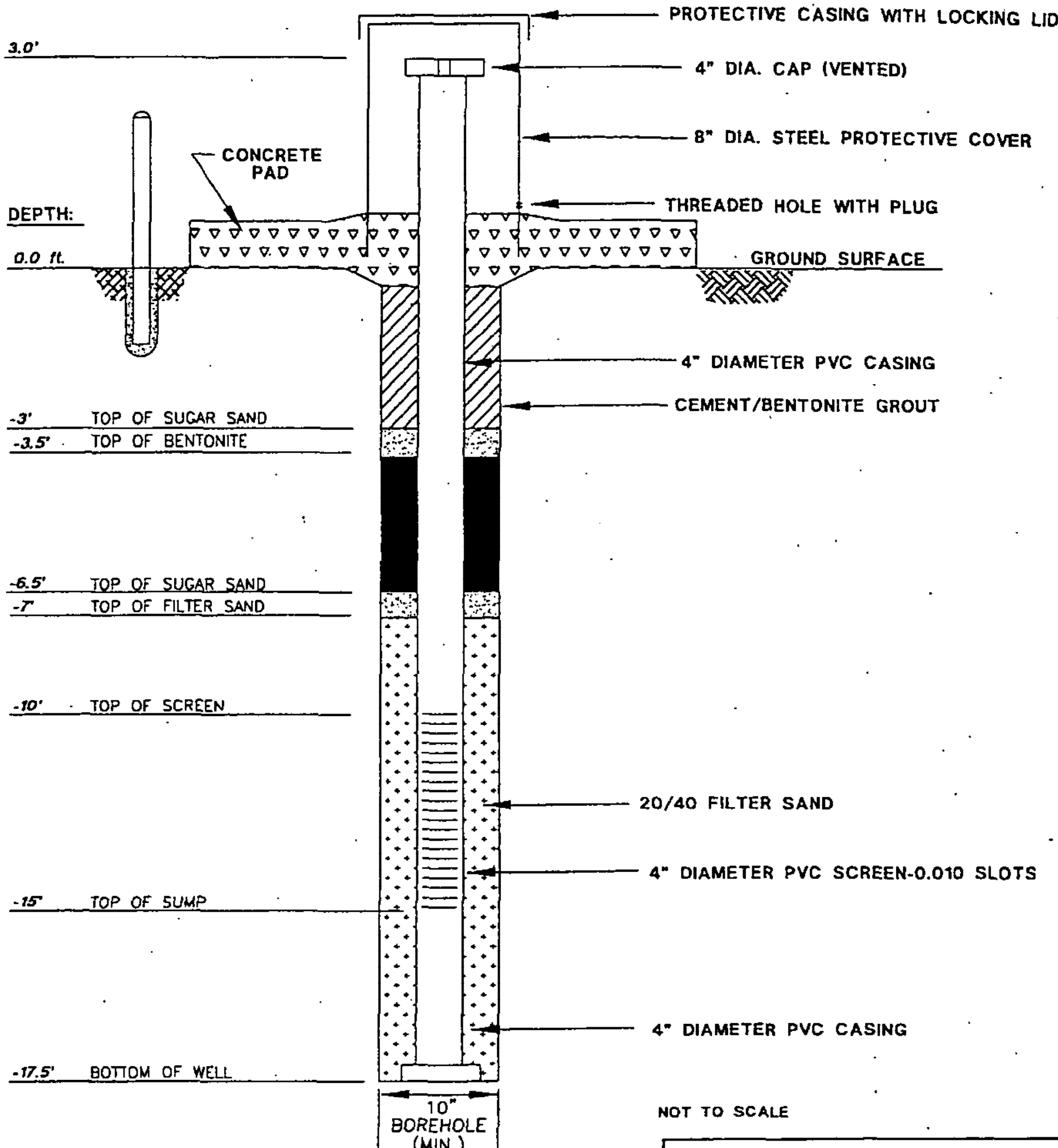
Well No. SW-16

Aquifer Shallow Water Table Zone

Depth Interval ______



Elevation of top of surface casing / riser pipe.	/14.
Height of top of surface casing / riser pipe above ground surface	/3.4
Depth of surface seal below ground surface	
Type of surface seal:	
I.D of surface casing.	
Type of surface casing:	
Depth of surface casing below ground	
I.D. of riser pipe.	4"
Type of riser pipe: 4" Sch. 40 PVC	
Diameter of borehole	10"
Depth of borehole	10.5'
Type of backfill: Cement/Bent. Grout	
Elev./depth top of seal.	+6.82/4.0'
Type of seal: 100% Bentonite Pellets	
Elev./depth bottom of seal.	+5.82/5.0'
Type of sand pack 20-40 Col. Sand	
Depth of top of sand pack.	+5.82/5.0'
Elev./depth top of screened section.	+5.32/5.5'
Type of screened section: 4" Sch. 40 PVC	
Describe openings Horizontal 0.010 inch slots	
I.D. of screened section.	4"
Elev./depth bottom of screened section.	+0.32/10.5
Length of blank section	0
Elev./depth bottom of plugged blank section	+0.32/10.5
Elev./depth bottom of sand column	+0.32/10.5
Type of backfill below observation pipe None	
Elev./depth of hole	+0.32/10.5



LEGEND

DATE INSTALLED:	11/16/90
ELEVATION TOP OF CASING:	10.67 FEET NGVD
LATITUDE:	30° 06' 03"
LONGITUDE:	90° 53' 05"

INSTALLED BY SOIL TESING ENGINEERS, INC.

WELL CONSTRUCTION DIAGRAM

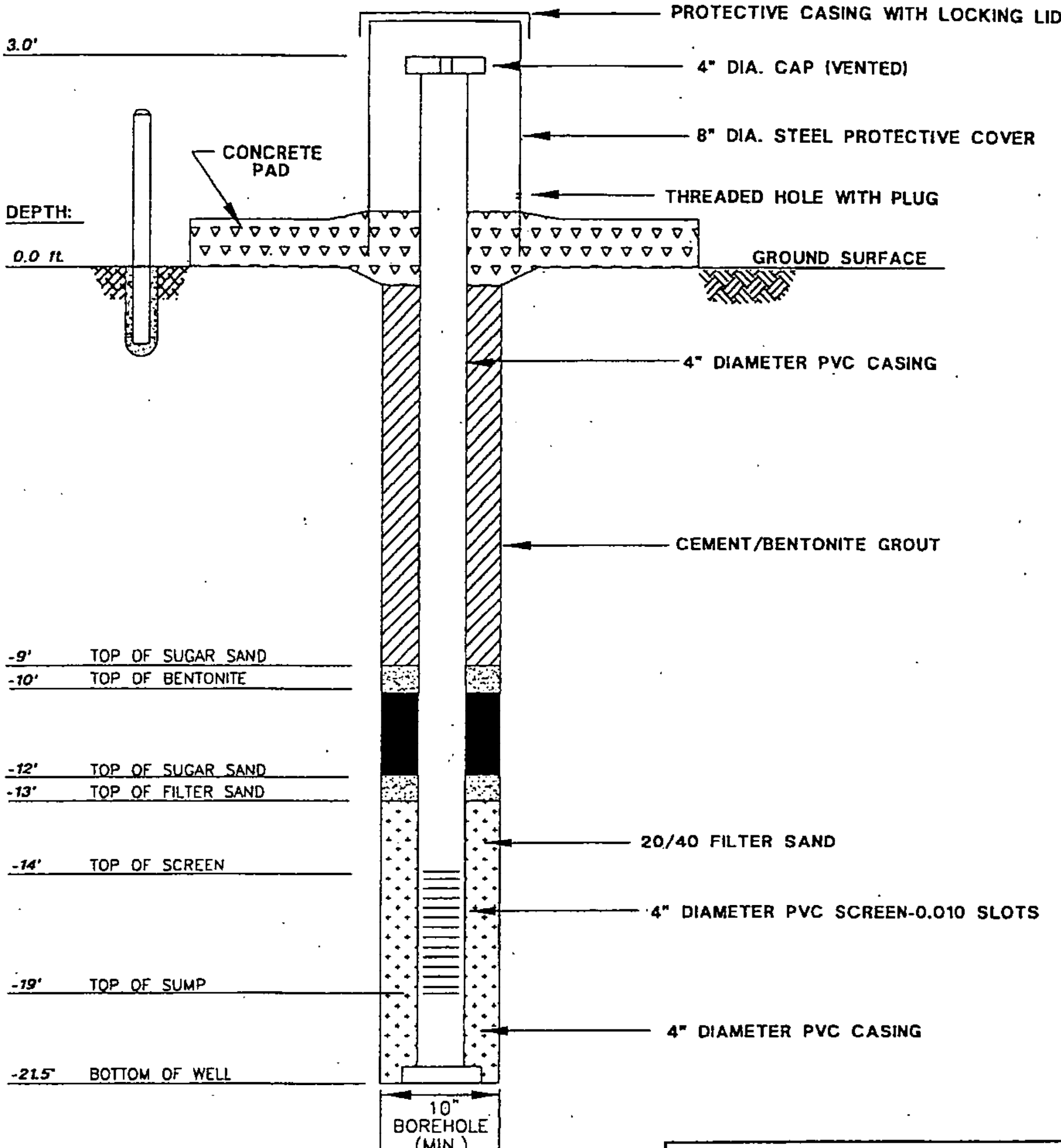
MOTIVA ENTERPRISES LLC
SW-17
CONVENT, LOUISIANA

PREPARED FOR

MOTIVA ENTERPRISES LLC
CONVENT REFINERY
CONVENT, LOUISIANA

SEMS Inc.

DRAWN BY	LDG	CHECKED BY		DRAWING #
	03/26/01	APPROVED BY		WD-SW17



LEGEND

DATE INSTALLED:	11/16/90
ELEVATION TOP OF CASING:	10.28 FEET NGVD
LATITUDE:	30° 06' 00"
LONGITUDE:	90° 53' 07"

INSTALLED BY SOIL TESING ENGINEERS, INC.

NOT TO SCALE

WELL CONSTRUCTION DIAGRAM

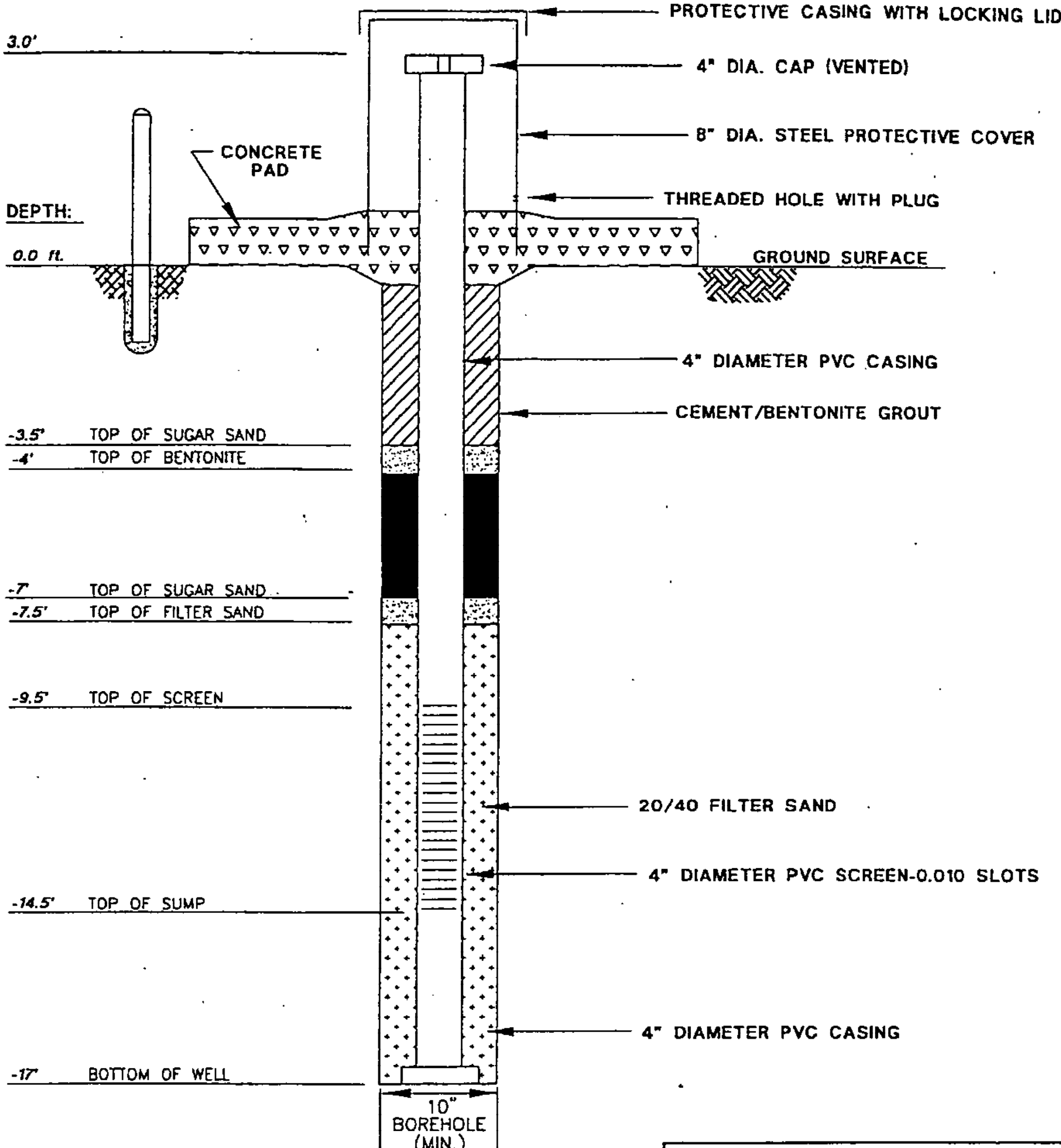
MOTIVA ENTERPRISES LLC
SW-18
CONVENT, LOUISIANA

PREPARED FOR

MOTIVA ENTERPRISES LLC
CONVENT REFINERY
CONVENT, LOUISIANA

SEMS Inc.

DRAWN BY	LDG	CHECKED BY		DRAWING #
	03/29/01	APPROVED BY		WD-SW18



LEGEND

DATE INSTALLED:	11/15/90
ELEVATION TOP OF CASING:	9.98 FEET NGVD
LATITUDE:	30° 06' 00"
LONGITUDE:	90° 53' 12"

INSTALLED BY SOIL TESING ENGINEERS, INC. NOT TO SCALE

WELL CONSTRUCTION DIAGRAM

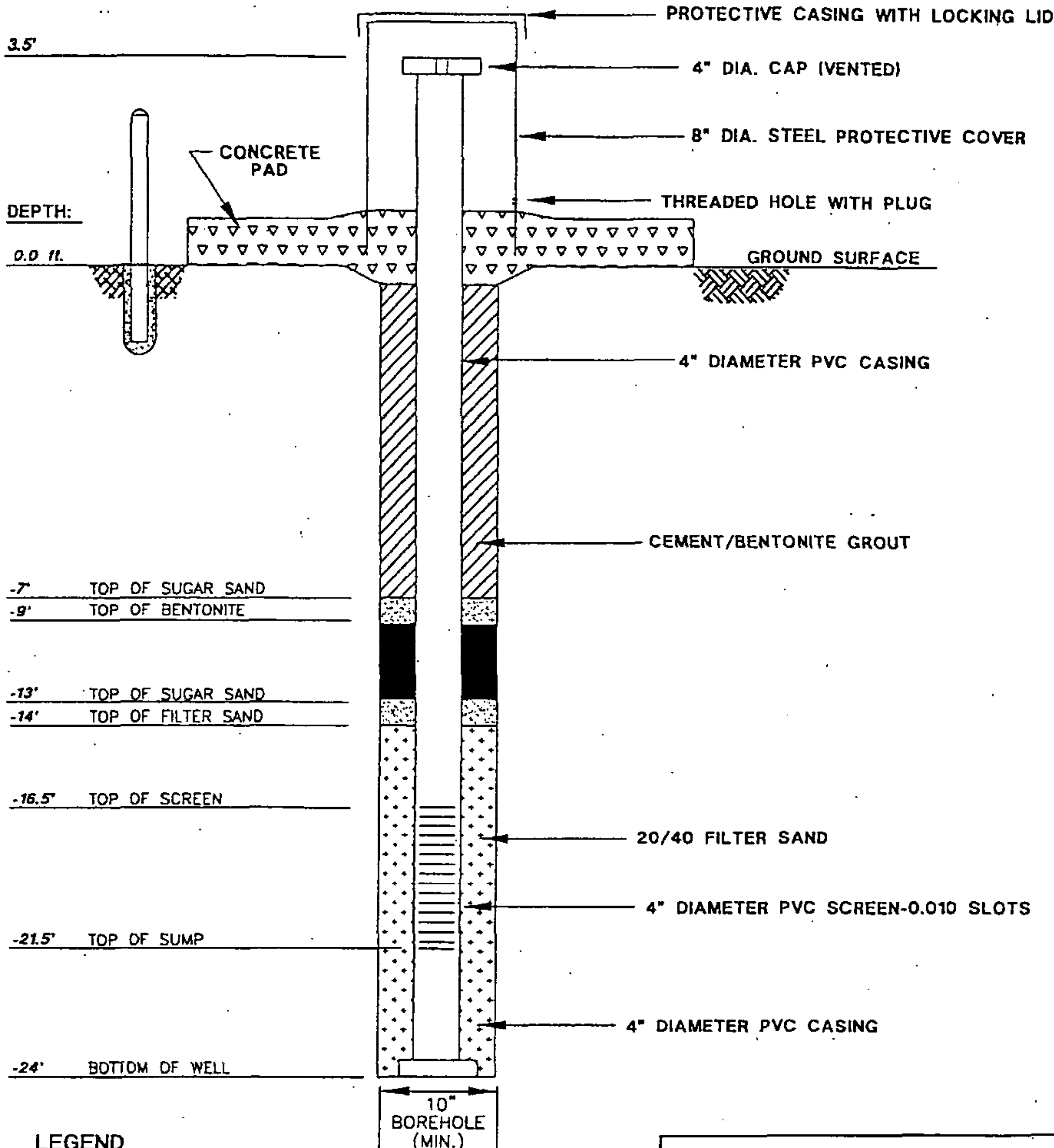
MOTIVA ENTERPRISES LLC
SW-19
CONVENT, LOUISIANA

PREPARED FOR

MOTIVA ENTERPRISES LLC
CONVENT REFINERY
CONVENT, LOUISIANA

SEMS Inc.

DRAWN BY	LDG	CHECKED BY		DRAWING #
	03/26/01	APPROVED BY		WD-SW19



LEGEND

DATE INSTALLED:	11/15/90
ELEVATION TOP OF CASING:	14.5 FEET NGVD
LATITUDE:	30° 06' 04"
LONGITUDE:	90° 53' 13"

INSTALLED BY SOIL TESING ENGINEERS, INC.

NOT TO SCALE

WELL CONSTRUCTION DIAGRAM

MOTIVA ENTERPRISES LLC
SW-20
CONVENT, LOUISIANA

PREPARED FOR

MOTIVA ENTERPRISES LLC
CONVENT REFINERY
CONVENT, LOUISIANA

SEMS Inc.

DRAWN BY	LDG	CHECKED BY		DRAWING #
	03/29/01	APPROVED BY		WD-SW20

APPENDIX K

GROUNDWATER VELOCITY CALCULATIONS

C-K ASSOCIATES · INC
ENVIRONMENTAL & ENGINEERING CONSULTANTS

CALCULATIONS AND SKETCHES

JOB NO. 057-980
BY PLP DATE 1-12-99
CHECKED TAB DATE 1-12-99
PAGE 1 OF 1 REV. 0

CLIENT Motiva Enterprises, L.L.C. (Convent)
DESCRIPTION Hydraulic Gradient Calculations for WWTU

① Hydraulic Gradient between 7.6 and 5.6 contours

$$HG = \frac{\Delta GW\ Elev}{\Delta\ Distance}$$

$$HG_{①} = \frac{(7.6-5.6)\ ft}{1730\ ft} = \boxed{0.0012\ ft/ft}$$

$$HG_{①} = 0.0012\ ft/ft \approx \boxed{0.001\ ft/ft}\ *$$

② Hydraulic Gradient between 5.6 and 3.6 contours

$$HG_{②} = \frac{(5.6-3.6)\ ft}{340\ ft} = 0.0059\ ft/ft \approx \boxed{0.006\ ft/ft}\ *$$

$$HG_{②} = \boxed{0.0059\ ft/ft}$$

③ Hydraulic Gradient near impoundments

$$HG_{③} = \frac{[1.6-(-4.4)]\ ft}{50\ ft} = \boxed{0.12\ ft/ft}$$

$$HG_{③} = 0.12\ ft/ft \approx \boxed{0.1\ ft/ft}\ *$$

APPENDIX L

CERTIFICATION OF COMPLIANCE

CERTIFICATION OF COMPLIANCE

I certify under penalty of law that I have personally examined and I am familiar with the information submitted in this permit application and that the facility as described in this permit application meets the requirements of the Solid Waste Rules and Regulations. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

Motiva Enterprises, LLC

Doug P. Quinn
Refinery Manager, Convent Refinery

July 28, 2005
Date

APPENDIX M

GROUNDWATER SAMPLING AND ANALYSIS PLAN

MOTIVA ENTERPRISES, LLC
CONVENT REFINERY

GROUNDWATER SAMPLING AND ANALYSIS PLAN

JUNE 2005

Prepared by:

C-K Associates, LLC
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Baton Rouge, LA 70810
(225) 755-1000

C-K Project No. 1983W

MOTIVA ENTERPRISES, LLC
CONVENT REFINERY

GROUNDWATER SAMPLING AND ANALYSIS PLAN

JUNE 2005

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) addresses groundwater monitoring requirements for three separate permitted facilities within the Motiva Enterprises, LLC. Convent, Louisiana Refinery (Motiva). These facilities include 1) RCRA hazardous waste post-closure units (Hazardous Waste Permit LAD065485146-PC-1), 2) a solid waste permitted biosludge landfarm (Solid Waste Permit P-0246), and 3) solid waste permitted waste water treatment (WWT) ponds (Solid Waste Permit P-0126) . This SAP was prepared in accordance with LAC 33:V.Chapter 33 and LAC 33:VII.Chapters 5 and 7. Previously, separate SAP documents existed for each of the permitted facilities. The monitoring programs presented in each of those previous documents were updated and are presented in this SAP as a single consolidated document.

RCRA Hazardous Waste Post-Closure Units

Four RCRA hazardous waste post-closure units exist. These units consist of two closed Land Treatment Units; Land Treatment Unit 1 and Land Treatment Unit 2 (also known as Landfarm No. 1 and Landfarm No. 2), and two closed surface impoundments; the former Equalization Basin (EQ Pond) and the closed portion of the South Contaminated Water Surge Pond (South Pond). All of these units have been closed and are in post-closure care. A condition of the post-closure care period is that a post-closure groundwater detection monitoring system be established and maintained, in accordance with the requirements of LAC 33:V.Chapter 33.

Biosludge Landfarm and Waste Water Treatment Ponds

Motiva also operates a biosludge landfarm unit and WWT ponds that are covered under separate solid waste permits. The biosludge landfarm occupies approximately 15 acres and consists of three active cells termed Cells A, B, and C. The WWT ponds include five active surface impoundments (Aeration Basins No. 1 and 2, the Recycle Pond, the South Surge Pond, and the East Surge Pond) and the closed North Contaminated Water Surge Pond. Solid Waste Permit numbers P-0246 and P-0126, and LAC 33:VII. Chapters 5 and 7 outline the groundwater monitoring program requirements for these facilities.

2.0 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system for all three of the permitted facilities consists of a total of 22 wells as shown in **Figure 1**. **Table 1** presents the monitoring well characteristics for the groundwater monitoring system. Eight of these wells monitor the Shallow Zone (screened between 5 and 12 feet below ground surface, bgs). Nine wells monitor the Intermediate Zone (screened between 12 and 17 ft bgs) and five wells monitor the Deep Zone (screened between 23 and 28 ft bgs).

In addition, four wells (which are not currently monitored) screen the 100-Foot Zone. These wells are completed to depths between 106 and 114 feet bgs and are available for monitoring, if needed.

While slight directional variations have been noted historically, the general direction of groundwater flow within each of the three upper zones is toward the Southeast. Therefore, the groundwater monitoring system is designed with "upgradient wells" located generally to the northwest of permitted units and "downgradient point of compliance wells" located generally to the southeast of permitted units.

Upgradient wells consistently yield groundwater samples that represent the quality of background groundwater. Downgradient wells are located to yield samples that are representative of groundwater passing the relevant point of compliance and would theoretically provide indication should the subject facilities impact groundwater quality. In all cases, at least two downgradient wells are installed per monitored zone and their spacing does not exceed 800 feet.

2.1 RCRA Hazardous Waste Post-Closure Units

The groundwater monitoring system for the RCRA Hazardous Waste Post-Closure units consists of sixteen wells screened in the upper three groundwater zones. Wells SW-2R through SW-6 monitor the Deep Zone, wells SW-1 and SW-7 through SW-10 monitor the Intermediate Zone, and well SW-11 through SW-16 monitor the Shallow Zone.

Upgradient wells:

SW-16	Shallow Zone	Screened 5-10 ft-bgs
SW-1	Intermediate Zone	Screened 13-18 ft-bgs
SW-10	Intermediate Zone	Screened 12-17 ft-bgs
SW-2R	Deep Zone	Screened 22-27 ft-bgs

Downgradient Point of Compliance wells:

SW-11,-12, -13,-14, and -15	Shallow Zone	Screened 5-10 ft-bgs
SW-7,-8, and -9	Intermediate Zone	Screened 12-17 ft-bgs
SW-3, -4, -5, and -6	Deep Zone	Screened 23-28 ft-bgs

2.2 Biosludge Landfarm

The Biosludge Landfarm groundwater monitoring system consists of four wells including SW-17, -18, -19, and -20. All four wells are screened in the Intermediate Zone.

Upgradient well:

SW-20	Intermediate Zone	Screened 16.5-21.5 ft-bgs

Downgradient Point of Compliance wells:

SW-17	Intermediate Zone	Screened 10-15 ft-bgs
SW-18	Intermediate Zone	Screened 14-19 ft-bgs
SW-19	Intermediate Zone	Screened 9.5-14.5 ft-bgs

2.3 Waste Water Treatment Ponds

The WWT ponds groundwater monitoring system consists of 12 wells. Wells SW-2 through SW-6 monitor the Deep Zone and wells SW-1, and SW-7 through SW-10 monitor the Intermediate Zone. Wells MW-21 and MW-22 monitor the shallow zone.

Upgradient wells:

SW-1	Intermediate Zone	Screened 13-18 ft-bgs
SW-10	Intermediate Zone	Screened 12-17 ft-bgs
SW-2R	Deep Zone	Screened 23-28 ft-bgs

Downgradient Point of Compliance wells:

MW-21 and -22	Shallow Zone	Screened 5-12 ft-bgs
SW-7 and -8	Intermediate Zone	Screened 12-17 ft-bgs
SW-9	Intermediate Zone	Screened 10-15 ft-bgs
SW-3, -4,-5, and-6	Deep Zone	Screened 23-28 ft-bgs

3.0 DETECTION MONITORING PARAMETERS

Table 2 presents a list of all parameters that will be monitored in some or all wells as part of the groundwater monitoring program (for all three permitted facilities). This table also presents sample container and preservation requirements, method numbers, and practical quantitation limits. **Table 3** presents a list of specific wells and corresponding analytical parameters that are required for testing for the three permitted facilities. **Table 4** presents a list of the analytical parameters and the corresponding permitted facilities.

4.0 MONITORING SCHEDULE

Groundwater monitoring for each of the three permitted facilities will be performed on an annual basis. The use of an annual monitoring schedule reflects a change to the previous semi-annual schedule for each of the facilities based on the following considerations:

- Favorable hydrogeologic conditions (low groundwater migration rates within silty/clayey hydrogeologic strata as presented in "2003 Annual Groundwater Monitoring Report", SEMS, Inc., February 2004); and
- Favorable historic groundwater monitoring data collected semi-annually between 1991 and 2004

Calculated horizontal groundwater velocity values range from approximately 0.085 to 0.205 feet/year within the Shallow, Intermediate, and Deep Zones (SEMS, Inc., 2004). These relatively low horizontal velocity values result from the low horizontal hydraulic conductivity of silty sediments that comprise these zones, and the low hydraulic gradients observed in each of the zones. Vertical hydraulic conductivity values are expected to be considerably lower, typically between two to ten times less for fluvial sediments, and up to 100 times less for clayey sediments (Groundwater Hydrology, Todd, 1980). As a result, vertical groundwater velocity at the subject site is expected to be even lower than the calculated horizontal groundwater velocity. The low horizontal and vertical velocity values indicate that, should a release occur from any of the permitted facilities, annual groundwater monitoring would be sufficient to confirm a release and appropriately evaluate plume migration.

A review of historic groundwater monitoring data, summarized in **Table 5**, has indicated that no organic compounds have been detected over many years of groundwater monitoring (except for sporadic or isolated detections of phenols and one unconfirmed detection of xylenes). Phenols have been occasionally detected in both upgradient and downgradient wells indicating these detections are not associated with the permitted facilities.

5.0 GROUNDWATER SAMPLING PROCEDURES

This section describes groundwater sampling procedures including sample collection, preservation and shipping, and chain-of-custody control.

5.1 Sample Collection

The sampling team will log the required information into the Monitor Well Sampling Data sheets (**Attachment 1**). This documentation will be kept on file at Motiva.

The water elevation in each well is measured and recorded to the nearest 0.01-foot increment with a calibrated water level indicator. The depth to water (DTW) is referenced to the top of the PVC monitoring well casing, which is then converted to water elevation in feet above the National Geodetic Vertical Datum (NGVD) using the surveyed top of the monitoring well casing elevation. All well elevations will generally be checked on the same day, prior to purging, so that an accurate potentiometric surface elevation map may be drawn. The total depth of each well (TWD) must be measured to determine if silting has occurred (**Attachment 2**).

Prior to purging, each well must be checked to determine if any constituents with a density less than water (floaters) or greater than water (sinkers) are present.

The wells will then be purged by removing a volume of water equal to at least three times the volume of water initially contained in each well by using dedicated or adequately cleaned equipment. The minimum purge volume (MPV) to be purged is calculated as follows:

MPV (gal) = Pi* diameter (in)^2/4*1 ft^2/144 in^2 * 7.48 gal/ft^3 * (TWD-DTW) *3

TWD = Total well depth,
DTW = Depth to water

For 0.75 " diameter wells:
MPV (gal) = 0.07 * (TWD – DTW)

For 3 " diameter wells:
MPV (gal) = 1.10 * (TWD – DTW)

For 4 " diameter wells:
MPV (gal) = 1.96 * (TWD – DTW)

If a well cannot be purged of three well volumes, it is purged to dryness.

The wells are allowed to recharge (within 24 hours of purging) before samples are collected. Upgradient wells should be sampled first to avoid potential cross contamination.

Samples are collected from each well by use of dedicated or adequately cleaned equipment. Care will be taken to avoid placing clean sampling equipment on the ground or on any contaminated surface.

During sampling events, wells will be inspected for signs of tampering, damage, corrosion, faulty locking devices, etc. The results of the inspection are noted on **Attachment 1.** This attachment will be turned into the Motiva groundwater contact. Any damage to the monitoring wells must be submitted to the administrative authority within 7 days and should be immediately corrected.

Instrument calibration must be checked and recorded before and after each sampling event and should be checked and recorded before and after each well measurement. The pH probe and the specific conductance port are rinsed with deionized/distilled water between each aliquot. The specific conductance port is rinsed with water from the next aliquot before the measurement is taken.

All collection bottles will be new or pre-washed. Any sampling tubing is replaced between sampling each well. A water resistant marker is used to label the sample bottles, and the container label will be checked for proper markings.

5.2 Sample Preservation and Shipment

Collected samples will be immediately preserved in the field by placing them on ice in a cooled, insulated container. Sample bottles provided will be prepared with the proper preservatives, if necessary.

Prior to delivery or shipment to a laboratory, sample bottles will be double-checked for leaks, cracks, and proper labeling. The samples will then by logged by the Field Supervisor on the Chain-of Custody form and the samples are transported, with as few transfers as possible, immediately to the analytical laboratory. Once the samples reach the laboratory, the samples will be rechecked for breakage or leakage that may have occurred during transport. Samples will then be signed over to laboratory personnel according to chain-of-custody procedures. Upon receipt, the authorized laboratory personnel store and/or prepare the samples for analysis, taking into consideration the holding times for the parameters for which the sample will be analyzed.

5.3 Chain of Custody Control

A chain of custody is used to trace the possession and handling of samples from the time of collection through laboratory analysis. Documentation of responsibility for the samples collected is provided by completing the Chain-of-Custody Form. The Chain-of-Custody form will be initiated in the field at the time of sample collection. The original will accompany the samples through contract laboratory analysis, with copies retained at any intermediate step.

Upon completion of the analysis, the custodian responsible for the analysis will complete the Chain-of-Custody Form, file a copy, and send a copy to the facility representative, along with the analytical results.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

This section describes the procedures utilized for quality assurance and quality control (QA/QC), including detection limits, precision and accuracy of analyses, field blanks, and laboratory spikes and blanks.

6.1 Field Quality Control

Field quality control measures are proven procedures for collecting representative samples, calibrating field testing equipment, preserving samples for analysis, and documenting chain-of-custody. These measures contribute to sampling events producing monitoring results that are reliable indicators of groundwater quality.

Duplicate samples are taken a rate of one per 20 samples not including QA/QC samples. Split samples are submitted for analysis to a separate laboratory, if deemed necessary by the Motiva groundwater contact. If decontamination of sampling equipment is necessary, equipment blanks are taken at the rate of one sample per day.

6.1.1 Field Blank

A field blank is collected to determine potential absorption of volatile organics from the air into a sample. The field blank is collected at the sampling site by filling a container received from the laboratory with deionized water and without the use of any intermediary tubes of vessels. The field blank should be taken at a rate of one per day.

The field blank is labeled with a unique identification number and standard chain-of-custody procedures are followed. For the volatile organic analysis, the field blank is subjected to the same laboratory analysis as the samples. The concentration levels of any contaminant found in the field blank will be noted and compared to the sample results.

6.1.2 Trip Blank

A trip blank, also known as a laboratory blank, is furnished by the laboratory to detect and quantify potential chemical artifacts originating from sample containers, deionized water, or laboratory handling procedures. Trip blanks should be taken at a rate of one per day.

The trip blank is produced at the laboratory by filling two containers with deionized water in the laboratory prior to field mobilization. The trip blank is transported to the sampling location and returned to the laboratory with the samples. The trip blank is not opened in the field, but is subjected to the same volatile analysis as the samples. The concentration levels of any contaminant found in the trip blank will be noted and compared to sample results. Trip blanks should be taken at a rate of one per day.

6.2 Laboratory Quality Control

All the groundwater samples will be submitted to a qualified laboratory which performs testing according to documented and approved procedures by trained personnel using calibrated equipment. QA/QC procedures, laboratory spikes and blanks, precision and accuracy of analyses, and detection limits, conform to those specified in U.S. EPA Test Methods for Evaluating Solid Waste (SW-846), or other methods approved by the administrative authority.

7.0 EVALUATING GROUNDWATER DATA

This section presents groundwater data evaluation procedures. These procedures include a two part process for determining if analytical results show statistically significant evidence of contamination Specifically, the results of the qualitative trend analysis and the statistical analysis are to be used together to identify evidence of contamination. If both analyses indicate evidence of contamination, Motiva will follow regulations per LAC 33:V.3317.G, including notifying the administrative authority in writing within seven days.

7.1 Graphical Trend Analysis

A qualitative trend analysis of graphed data is performed on the data collected from the wells that monitor the Biosludge Landfarm, WWT Ponds and the RCRA Hazardous Waste Post-Closure Units. This analysis of graphed data (constituent concentration versus time) includes noting of increasing and decreasing trends in constituent concentrations and comparison to historically high and low constituent concentrations.

7.2 Statistical Evaluation

Parameter and constituent concentrations at each monitoring well are analyzed to determine whether there is statistically significant evidence of contamination. The method used in the statistical analysis of data is the combined Shewhart-cumulative sum Control Chart, as recommended in EPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance (EPA, 1989), and the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (EPA, 1992). The use of control charts in Motiva's groundwater sampling and analysis program is appropriate and meets the applicable performance standards in LAC:VII.709.E.2.e.iii.

The combined Shewhart-cumulative sum (CUSUM) Control Chart provides for an intrawell comparison rather than a comparison between background data and compliance point data. The intrawell comparison is beneficial because the inherent spatial and/or hydrogeological variability between two wells in two different locations (i.e. a background well and a compliance well) is eliminated. The control chart is used to monitor the statistical variation of data collected from a single well.

Use of control charts assumes the following:

- The well is known to be uncontaminated;

- Sample data can not have a significant number of non-detects;
- Sample data are normally distributed (the Shapiro-Wilk or Shapiro-Francia hypothesis test for normality should be conducted prior to adding the data to the control chart);
- Sample data are independently distributed; and
- Baseline data reflect current background concentrations.

Of the assumptions listed above, one of the least restrictive is the assumption of normally distributed data. As recommended in EPA guidance (EPA 1992), if the base data set for a control chart is log-normally distributed, a control chart can be constructed based on the log transformed data.

Data, initially collected at the time the wells were installed, and from subsequent monitoring events (in accordance with EPA guidance, eight samples which have been collected from a well within one year) are used to establish the control chart's baseline parameters. These baseline parameters are estimates of the well mean and well variance, and are used to standardize future monitoring data. For each subsequent sampling event, a standardized mean is calculated using the following formula:

$$Z_i = \sqrt{n_i}(\bar{x}_i - m)/s$$

For a specific sampling event at time Ti, assume that n1…ni concentration measurements are available. Therefore, Zi is the standardized mean, xi-bar is the average of concentration measurements n1…ni, m is the baseline mean concentration from prior monitoring events and s is the baseline standard deviation from prior monitoring events.

Next, a cumulative sum (CUSUM) is calculated using the following formula:

$$S_i = \max\{0, (Z_i - k) + S_{i-1}\}$$

where S_i is the CUSUM for the ith period, Z_i is the standard mean for that period, k is a pre-determined control chart parameter, and S_{i-1} is the CUSUM for the previous time period.

The CUSUM values and the standardized mean values are plotted on the control chart. Additionally, two pre-determined thresholds, h (decision internal value) and SCL (Shewhart Control Limit), are drawn on the chart. If the CUSUM exceeds h, or if the standardized mean exceeds the SCL, there is a statistically significant evidence of contamination. As such, the chart can show a statistical increase, or be declared 'out-of-control" in one of two ways.

> For the purposes of groundwater monitoring, EPA has determined, and recommends (EPA, 1989) that the combination of k=1, h=5, and SCL=4.5 are most appropriate in the construction of a groundwater monitoring control chart.

As stated previously, the results of the qualitative trend analysis and the statistical analysis are to be used in concert with one another, in a two-part determination as to whether there is statistically significant evidence of contamination.

Additionally, as recommended in EPA guidance, Motiva desires to allow for flexibility in this Sampling and Analysis Plan, with regard to allowing for adjustment of baseline data to include data from more recent sampling events. Incorporating data from more recent sampling events provides a better estimate of the background mean and variance (EPA, 1992). Also, as provided for in the hazardous waste permit, Motiva would like to have the option to propose an equivalent, EPA- and LDEQ-approved statistical method that may prove to more accurately identify the presence of contaminants.

8.0 REPORTING AND RECORDKEEPING

Separate reports are required for each of the permitting facilities. In each case, an annual report will be prepared that will include required elements per LAC 33:V.Chapter 33 and LAC 33:VII.Chapters 5 and 7. All three annual reports will be submitted to LDEQ by Motiva by March 1 of each year. Each of the three annual reports will contain the following information pertaining to the annual sampling of the three permitted facilities:

- A discussion of the groundwater monitoring system;
- A discussion of sampling procedures;
- An evaluation and interpretation of the analytical results of the groundwater monitoring, including groundwater flow and water quality analysis;
- A statistical analysis of the monitoring well analytical;
- A review of concentration vs. time graphs for each well;
- A statement of whether a statistically significant difference in concentrations is detected, based on intrawell comparisons;
- Documentation of the chain-of-custody of sampling and analyses;
- A scaled potentiometric surface map showing monitoring well locations and groundwater elevations with respect to mean sea level or equivalent for the stratum monitored;
- Copies of required monitoring data forms; and
- A calculation of groundwater flow rates (hazardous waste post-closure units report only).

A copy of each report will be retained at the facility.

TABLES

TABLE 1

GROUNDWATER MONITORING WELL CHARACTERISTICS

Table 1
Groundwater Monitoring Well Characteristics

Motiva Enterprises, LLC
Convent, Louisiana

SITE MONITORING WELL NO.	SW-1	SW-2R	SW-3	SW-4	SW-5
Latitude	30°07'3.01"	30°07'2.56"	30°06'43.95"	30°06'46.67"	30°06'53.98"
Longitude	90°53"29.15"	90°53'38.9"	90°53'20.25"	90°53'11.99"	90°53'14.72"
Latitude/Longitude Method	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927
Facility Monitored	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU
Associated Permit Number	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126
Well Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Well Status	Active	Active	Active	Active	Active
Gradient	Up	Up	Down	Down	Down
Casing Diameter (inches)	3"	3"	3"	3"	3"
Casing Material	PVC	PVC	PVC	PVC	PVC
Date Completed (yy,mm,dd)	07/25/83	07/02/98	07/30/83	8/7/83	8/3/83
Zone Monitored	Intermediate	Deep	Deep	Deep	Deep
Top of Casing Elevation (NGVD)	14.97'	13.29'	11.66'	11.50'	11.62'
Well Depth at Installation (feet, BGS)	23'	30'	33'	33'	33'
Ground Surface Elevation (NGVD)	12.4'	10.3'	9.2'	8.9'	9.1'
Top of Screened Interval (NGVD)	-0.6'	-12.2'	-13.8'	-14.1'	-13.9'
Bottom of Screened Interval (NGVD)	-5.6'	-17.2'	-18.8'	-19.1'	-18.9'
Sump Length (feet)	5'	2.5'	5'	5'	5'

Table 1
Groundwater Monitoring Well Characteristics

Motiva Enterprises, LLC
Convent, Louisiana

SITE MONITORING WELL NO.	SW-6	SW-7	SW-8	SW-9	SW-10
Latitude	30°07'01.43"	30°06'57.63"	30°06'50.33"	30°06'44.31"	30°07'01.02"
Longitude	90°53'18.22"	90°53'17.21"	90°53'13.60"	90°53'16.69"	90°53'43.99"
Latitude/Longitude Method	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927
Facility Monitored	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU
Associated Permit Number	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126
Well Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Well Status	Active	Active	Active	Active	Active
Gradient	Down	Down	Down	Down	Up
Casing Diameter (inches)	3"	4"	4"	4"	4"
Casing Material	PVC	PVC	PVC	PVC	PVC
Date Completed (yy,mm,dd)	7/26/83	6/10/87	6/11/87	6/11/87	6/15/87
Zone Monitored	Deep	Intermediate	Intermediate	Intermediate	Intermediate
Top of Casing Elevation (NGVD)	8.95'	12.11'	12.00'	13.05'	14.33'
Well Depth at Installation (feet, BGS)	33'	20'	20'	18'	20'
Ground Surface Elevation (NGVD)	6.4'	10.4'	9.5'	10.5'	10.5'
Top of Screened Interval (NGVD)	-16.6'	-1.6'	-5.5'	0.5'	-1.5'
Bottom of Screened Interval (NGVD)	-21.6'	-6.6'	-10.5'	-4.5'	-6.5'
Sump Length (feet)	5'	3'	3'	3'	3'

Table 1
Groundwater Monitoring Well Characteristics

Motiva Enterprises, LLC
Convent, Louisiana

SITE MONITORING WELL NO.	SW-11	SW-12	SW-13	SW-14	SW-15
Latitude	30°06'50.53"	30°06'53.91"	30°06'56.48"	30°06'57.67"	30°07'3.39"
Longitude	90°53'22.86"	90°53'23.74"	90°53'20.62"	90°53'17.00"	90°53'19.15"
Latitude/Longitude Method	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927
Facility Monitored	Post-Closure	Post-Closure	Post-Closure	Post-Closure	Post-Closure
Associated Permit Number	LAD 065-485-146-PC-1	LAD 065-485-146-PC-1	LAD 065-485-146-PC-1	LAD 065-485-146-PC-1	LAD 065-485-146-PC-1
Well Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Well Status	Active	Active	Active	Active	Active
Gradient	Down	Down	Down	Down	Down
Casing Diameter (inches)	4"	4"	4"	4"	4"
Casing Material	PVC	PVC	PVC	PVC	PVC
Date Completed (yy,mm,dd)	6/21/90	6/19/90	6/21/60	6/21/90	6/20/90
Zone Monitored	Shallow	Shallow	Shallow	Shallow	Shallow
Top of Casing Elevation (NGVD)	13.21'	12.30'	13.47'	12.41'	7.51'
Well Depth at Installation (feet, BGS)	9'	10'	10'	10'	8'
Ground Surface Elevation (NGVD)	10.8'	9.8'	11.2'	10.4'	5.2'
Top of Screened Interval (NGVD)	5.8'	4.8'	6.2'	6.4'	2.2'
Bottom of Screened Interval (NGVD)	1.8'	-0.2'	1.2'	0.4'	-2.8'
Sump Length (feet)	0'	0'	0'	0'	0'

Table 1
Groundwater Monitoring Well Characteristics

Motiva Enterprises, LLC
Convent, Louisiana

SITE MONITORING WELL NO.	SW-16	SW-17	SW-18	SW-19	SW-20
Latitude	30°07'01.05"	30°07'02.57"	30°07'00.19"	30°06'59.09"	30°07'03.35"
Longitude	90°53'43.78"	90°52'58.91"	90°53'01.93"	90°53'07.39"	90°53'12.65"
Latitude/Longitude Method	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927
Facility Monitored	Post-Closure	Biosludge	Biosludge	Biosludge	Biosludge
Associated Permit Number	LAD 065-485-146-PC-1	P-0246	P-0246	P-0246	P-0246
Well Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Well Status	Active	Active	Active	Active	Active
Gradient	Up	Down	Down	Down	Up
Casing Diameter (inches)	4"	4"	4"	4"	4"
Casing Material	PVC	PVC	PVC	PVC	PVC
Date Completed (yy,mm,dd)	6/20/90	11/16/90	11/15/90	11/15/90	11/16/90
Zone Monitored	Shallow	Intermediate	Intermediate	Intermediate	Intermediate
Top of Casing Elevation (NGVD)	14.00'	10.59'	10.13'	9.82'	14.40'
Well Depth at Installation (feet, BGS)	10.5'	17.5'	21.5'	17'	24'
Ground Surface Elevation (NGVD)	10.4'	8.2'	7.9'	7.7'	11.4'
Top of Screened Interval (NGVD)	4.9'	-1.8'	-6.1'	-1.8'	-5.1'
Bottom of Screened Interval (NGVD)	-0.1'	-6.8'	-11.1'	-6.8'	-10.1'
Sump Length (feet)	0'	2.5'	2.5'	2.5'	2.5'

Table 1
Groundwater Monitoring Well Characteristics

Motiva Enterprises, LLC
Convent, Louisiana

SITE MONITORING WELL NO.	MW-1	MW-2	MW-3	MW-4
Latitude	30°07'01.00"	30°06'44.36"	30°06'52.00"	30°06'59.13"
Longitude	90°53'44.20"	90°53'16.48"	90°53'14.20"	90°53'18.09"
Latitude/Longitude Method	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927	Geodetic NAD 1927
Facility Monitored	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU	Post-Closure & WWTU
Associated Permit Number	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126	LAD 065-485-146-PC-1 & P-0126
Well Type	Monitoring	Monitoring	Monitoring	Monitoring
Well Status	Inactive	Inactive	Inactive	Inactive
Gradient	Up	Down	Down	Down
Casing Diameter (inches)	4"	4"	4"	4"
Casing Material	PVC	PVC	PVC	PVC
Date Completed (yy,mm,dd)				
Zone Monitored	100' Zone	100' Zone	100' Zone	100' Zone
Top of Casing Elevation (NGVD)	13.36'	13.88'	12.86'	13.27'
Well Depth at Installation (feet, BGS)	116'	119'	116'	111'
Ground Surface Elevation (NGVD)	10.4'	10.9'	9.2'	10.2'
Top of Screened Interval (NGVD)	-90.6'	-93.1'	-91.8'	-85.8'
Bottom of Screened Interval (MGVD)	-100.6'	-103.1'	-101.8'	-95.8'
Sump Length (feet)	5'	5'	5'	5'

Table 1
Groundwater Monitoring Well Characteristics

Motiva Enterprises, LLC
Convent, Louisiana

SITE MONITORING WELL NO.	MW-21	MW-22
Latitude	30°06'48.7"	30°06'53.2"
Longitude	90°53'08.9"	90°53'10.1"
Latitude/Longitude Method		
Facility Monitored	WWTU	WWTU
Associated Permit Number	P-0126	P-0126
Well Type	Monitoring	Monitoring
Well Status	Active	Active
Gradient		
Casing Diameter (inches)	0.75"	0.75"
Casing Material	PVC	
Date Completed (yy,mm,dd)	04/14/05	04/14/05
Zone Monitored	Shallow	Shallow
Top of Casing Elevation (NGVD)		
Well Depth at Installation (feet, BGS)	10'	12'
Ground Surface Elevation (NGVD)		
Top of Screened Interval (NGVD)		
Bottom of Screened Interval (NGVD)		
Sump Length (feet)	No sump	No sump

TABLE 2

ANALYTICAL PARAMETERS SUMMARY

Table 2
Analytical Parameters Summary

Motiva Enterprises, LLC
Convent, Louisiana

Parameter	Container Type	Preservation Method	Analytical Method	Practical Quantitation Limit* (ppb)
pH	glass or plastic	Field measurement	NA	0.010 standard units
Specific Conductance	glass or plastic	Field measurement	NA	1.0 mmhos/cm
Total Organic Carbon (TOC)	glass	HCl to pH < 2, Cool to 4°C	415.1	1,000
Total Dissolved Solids (TDS)	glass or plastic	Cool to 4°C	2540C	10,000
Total Kjeldahl Nitrogen (TKN)	glass or plastic	H_2SO_4 to pH <2,Cool to 4°C	351.2	50
BOD	glass or plastic	Cool to 4°C	405.1	2,000
Chloride	glass or plastic	Cool to 4°C	325.3	1,000
Nitrate	glass or plastic	Cool to 4°C	300.0 or 353.2	50
Sulfate	glass or plastic	Cool to 4°C	300.0	1,000
Iron, Dissolved	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	100
Manganese, Dissolved	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	15
Sodium, Dissolved	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	500
Arsenic, Dissolved	glass or plastic	Filter 0.45 micron, HNO_3 to pH <2, Cool to 4°C	6010	10
Barium, Dissolved	glass or plastic	Filter 0.45 micron, HNO_3 to pH <2	6010	200
Cadmium, Dissolved	glass or plastic	Filter 0.45 micron, HNO_3 to pH <2	6010	40
Chromium, Dissolved	glass or plastic	Filter 0.45 micron, HNO_3 to pH <2	6010	70
Lead, Dissolved	glass or plastic	Filter 0.45 micron, HNO_3 to pH <2	6010	40
Mercury, Dissolved	glass or plastic	Filter 0.45 micron, HNO_3 to pH <2	7470	2

Parameter	Container Type	Preservation Method	Analytical Method	Practical Quantitation Limit* (ppb)
Nickel	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	50
Selenium	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	750
Vanadium	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	80
Zinc	glass or plastic	HNO_3 to pH <2, Cool to 4°C	6010	20
Phenols	glass	H_2SO_4 to pH <2 Cool to 4°C	8270	5
Napthalene	glass	Cool to 4°C	8270	10
Chrysene	glass	Cool to 4°C	8270	10
2-methylnapthalene	glass	Cool to 4°C	8270	10
Phenanthrene	glass	Cool to 4°C	8270	10
Pyrene	glass	Cool to 4°C	8270	10
Benzo(a)anthracene	glass	Cool to 4°C	8270	10
Fluoranthene	glass	Cool to 4°C	8270	10
Benzene	glass	Cool to 4°C	8260	5
Ethylbenzene	glass	Cool to 4°C	8260	5
Toluene	glass	Cool to 4°C	8260	5
Xylenes	glass	Cool to 4°C	8260	5
Carbon Disulfide	glass	Cool to 4°C	8260	5
Turbidity	glass	Cool to 4°C	180.1	1.0 NTU

* Practical Quantitation Limits (PQLs) listed are as provided in LAC 33:V.Chapter 33, when available. Otherwise, PQLs were obtained from an LDEQ certified laboratory

TABLE 3

ANALYTICAL PARAMETERS BY WELL

Table 3

Analytical Parameters by Well

Motiva Enterprises, LLC
Convent, Louisiana

Parameter	SW -1	SW -2R	SW -3	SW -4	SW -5	SW -6	SW -7	SW -8	SW -9	SW -10	SW -11	SW -12	SW -13	SW -14	SW -15	SW -16	SW -17	SW -18	SW -19	SW -20
PH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Specific Conductance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Total Organic Carbon (TOC)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Total Dissolved Solids (TDS)																	X	X	X	X
Total Kjeldahl Nitrogen (TKN)																	X	X	X	X
BOD																	X	X	X	X
Chloride	X	X	X	X	X	X	X	X	X	X							X	X	X	X
Nitrate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sulfate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Iron, Dissolved	X	X	X	X	X	X	X	X	X	X										
Manganese, Dissolved	X	X	X	X	X	X	X	X	X	X										
Sodium, Dissolved	X	X	X	X	X	X	X	X	X	X										
Arsenic, Dissolved	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Barium, Dissolved	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Cadmium, Dissolved	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Chromium, Dissolved	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lead, Dissolved	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Mercury, Dissolved	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Nickel																	X	X	X	X
Selenium																	X	X	X	X
Vanadium																	X	X	X	X
Zinc																	X	X	X	X

Parameter	SW -1	SW -2R	SW -3	SW -4	SW -5	SW -6	SW -7	SW -8	SW -9	SW -10	SW -11	SW -12	SW -13	SW -14	SW -15	SW -16	SW -17	SW -18	SW -19	SW -20
Phenols	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Napthalene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Chrysene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
2-methylnapthalene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Phenanthrene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Pyrene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Benzo(a)anthracene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Fluoranthene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Benzene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Ethylbenzene																	X	X	X	X
Toluene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Xylenes	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carbon Disulfide	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Turbidity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				

TABLE 4

ANALYTICAL PARAMETERS BY PERMITTED FACILITY

Table 4
Analytical Parameters by Permitted Facility

Motiva Enterprises, LLC
Convent, Louisiana

Parameter	RCRA Hazardous Waste Post-Closure Units	Biosludge Landfarm	Waste Water Treatment Ponds
PH	X	X	X
Specific Conductance	X	X	X
Total Organic Carbon (TOC)	X		X
Total Dissolved Solids (TDS)		X	X
Total Kjeldahl Nitrogen (TKN)		X	
BOD		X	
Chloride		X	X
Nitrate	X	X	
Sulfate	X		X
Iron, Dissolved			X
Manganese, Dissolved			X
Sodium, Dissolved			X
Arsenic, Dissolved	X	X	
Barium, Dissolved	X		
Cadmium, Dissolved	X		
Chromium, Dissolved	X	X	
Lead, Dissolved	X		
Mercury, Dissolved	X		
Nickel		X	
Selenium		X	
Vanadium		X	
Zinc		X	
Phenols	X		X
Napthalene	X		
Chrysene	X		
2-methylnapthalene	X		
Phenanthrene	X		
Pyrene	X		
Benzo(a)anthracene	X		
Fluoranthene	X		
Benzene	X		
Ethylbenzene		X	
Toluene	X		X
Xylenes	X	X	X
Carbon Disulfide	X		
Turbidity	X		

TABLE 5

Table 5
Historic Groundwater Quality Data Summary

Motiva Enterprises, LLC
Convent, Louisiana

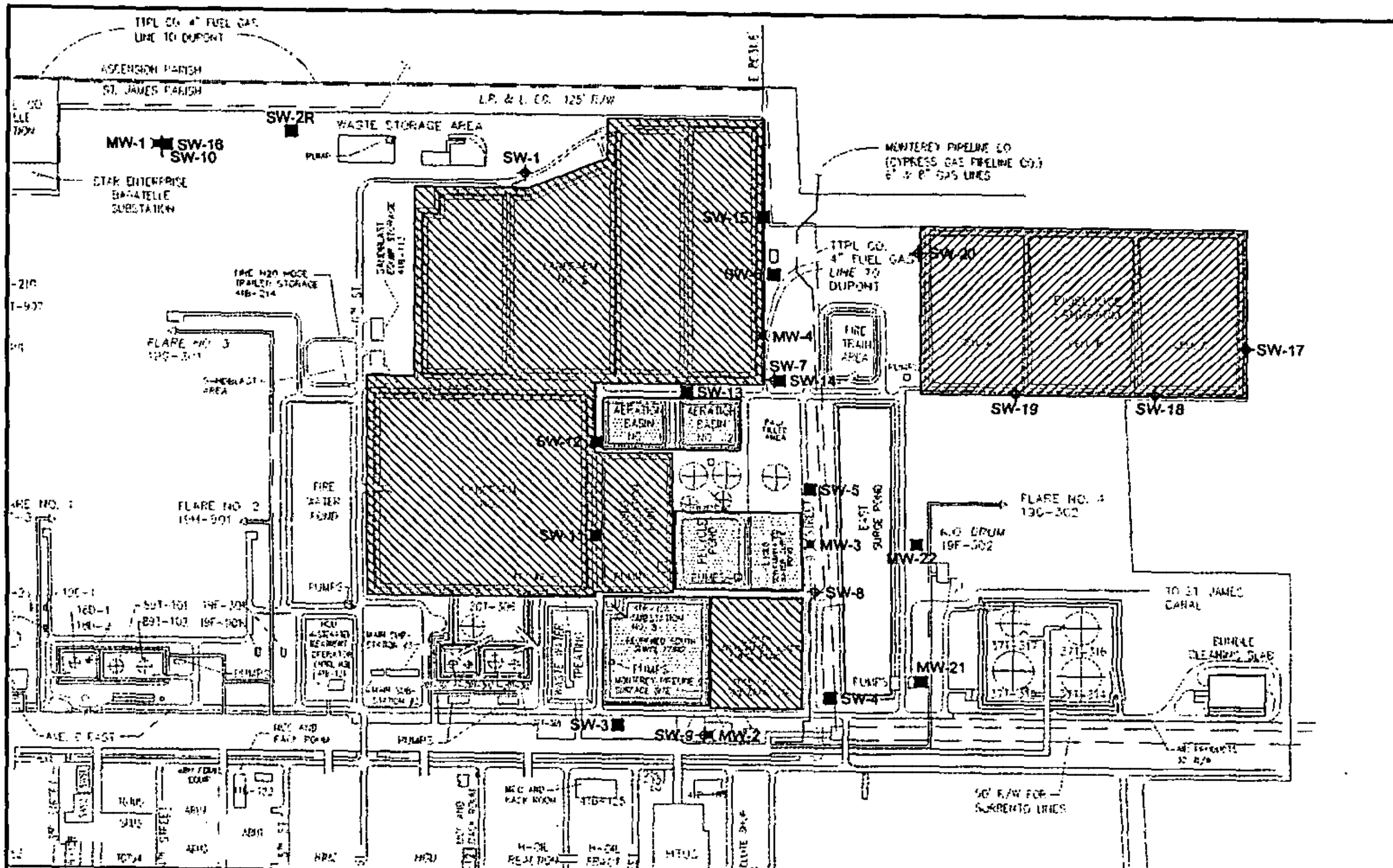
Parameter	Method	Permitted Facility	Detected	# of Samples Analyzed	# of Detections	Range (mg/L)		
2-Methylnaphthalene	8270	Post Closure	No	335	0		-	
Arsenic	6010	Post Closure	Yes	335	10	0.002	-	0.013
Barium	6010	Post Closure	Yes	334	153	0.04	-	1.75
Benzene	8260	Post Closure	No	336	0		-	
Benzo(a)anthracene	8270	Post Closure	No	336	0		-	
Cadmium	6010	Post Closure	Yes	334	1	0.004	-	NA
Carbon Disulfide	8260	Post Closure	No	336	0		-	
Chlorides	325.2	WWTP/Bio	Yes	184	178	1.2	-	378
Chromium	6010	Post Closure/Bio	Yes	419	28	0.0015	-	0.11
Chrysene	8270	Post Closure	No	336	0		-	
Ethylbenzene	8260	Bio	No	85	0		-	
Fluoranthene	8270	Post Closure	No	336	0		-	
Iron	6010	WWTP	Yes	104	51	0.013	-	2.32
Lead	6010	Post Closure/Bio	Yes	419	29	0.0032	-	0.1
Manganese	6010	WWTP	Yes	104	96	0.02	-	6.25
Mercury	7470	Post Closure	Yes	303	9	0.0002	-	5E-04
Naphthalene	8270	Post Closure	No	336	0		-	
Nickel	6010	Bio	Yes	85	3	0.06	-	0.084
Nitrate	353.2	Post Closure	Yes	351	85	0.02	-	0.83
Nitrogen, Total Kjeldahl	351.2	Bio	Yes	84	46	0.1	-	1.8
Phenanthrene	8270	Post Closure	No	331	0		-	
Phenols	8270	Post Closure	Yes	353	22	0.002	-	0.092
Pyrene	8270	Post Closure	No	336	0		-	
Sodium	6010	WWTP	Yes	104	68	14.9	-	145
Sulfate	375.4	Post Closure	Yes	338	321	1.37	-	177
Toluene	8260	Post Closure	No	336	0		-	
Xylene	8260 or 8021	Post Closure/Bio	Yes	420	1	0.000869	-	NA
Zinc	6010	Bio	Yes	83	36	0.01	-	0.569

Notes:
1) Post-Closure - RCRA Hazardous Waste Post-Cosure Units
2) Bio - Biosludge Landfarm
3) WWTP - Waste Water Treatment Ponds
4) NA - *Not applicable*

FIGURES

FIGURE 1

WELL LOCATION MAP



0	400	800

SCALE: 1" = 400'

WELL LOCATIONS

ID	NORTHING	EASTING
MW-1	4056.73	5837.51
MW-2	1660.38	7841.16
MW-3	2589.69	8208.46
MW-4	3367.45	8032.4
SW-1	3963.71	7171.1
SW-2R	4108.3	6325.88
SW-3	1913.9	7509.57
SW-4	2021.08	8277.6
SW-5	2794.75	8206.49
SW-6	3596.38	8072.04
SW-7	3202.21	8074.28
SW-8	2413.55	8221.28
SW-9	1679.56	7822.33
SW-10	4055.56	5856.86
SW-11	2612.37	7432.43
SW-12	2962.87	7432.08
SW-13	3155.57	7757.01
SW-14	3202.22	8093.11
SW-15	3807.52	8036.02
SW-16	4054.16	5874.72
SW-17	3336.22	9751.84
SW-18	3158.72	9439.86
SW-19	3156.22	8948.43
SW-20	3677.74	8592.1
MW-21	2062.01	8605.87
MW-22	2581.08	8596.14

LEGEND

- DEEP ZONE WELL
- INTERMEDIATE ZONE WELL
- SHALLOW ZONE WELL
- INACTIVE 100-FOOT WELL
- RCRA HAZARDOUS WASTE POST-CLOSURE UNITS
- BIOSLUDGE LANDFARM
- WASTE WATER TREATMENT PONDS

MOTIVA ENTERPRISES, LLC
CONVENT, LOUISIANA
SAMPLING AND ANALYSIS PLAN

WELL LOCATION MAP

ST. JAMES PARISH

C-K ASSOCIATES, LLC
ENVIRONMENTAL & ENGINEERING CONSULTANTS

Drawn:	ABL/ACAD
Checked:	AMB
Approved:	WWG
Date:	06/28/2003
Dwg. No.:	B1983W-18

FIGURE 1

APPENDICES

APPENDIX A

MONITOR WELL SAMPLING DATA

Appendix A - Monitor Well Sampling Data

Site: Motiva Enterprises LLC – Convent, LA   Monitor Well #: ______

Project: ______   Field Rep/Company: ______

Date/Time ______   Weather: ______

INSPECTION INFORMATION

	Y	N	Comments
Are protective posts or concrete pad damaged?	☐	☐	
Is pad lock in poor condition or unlocked?	☐	☐	
Is well shroud, cover, or well damaged?	☐	☐	
Does annulus between well & shroud contain water?	☐	☐	
Is weep hole drain plug damaged or missing?	☐	☐	
Is well sign or LDOTD tag missing or damaged?	☐	☐	
Do well shroud/protective posts require painting?	☐	☐	
Does purge water drum need to be labeled?	☐	☐	
Is well casing or well cap damaged?	☐	☐	

*If Yes is checked on any item please provide comments and consult with Environmental Department ASAP.

TOTAL WELL DEPTH/IMMISCIBLE LAYER CHECK

Depth to Water (ft) ______ LNAPL/DNAPL Thickness (in): ______ Total Measured Well Depth (A): ______

Depth at which 10% of screened interval is blocked (B): ______ (if A is less than B then contact Environmental Dept.)

Water Column, H (ft): ______ Well Dia., D (in): ______ Purge Vol. (Gal)* = $\Pi\ (D/12)^2/4 \times H \times 7.48\ gal/ft^3 \times 3 =$ ______

*Well Dia versus Purge Vol. Per foot (H): ¾" = 0.07 gal, 1" = 0.12 gal, 2" = 0.49 gal, 3" = 1.10 gal, 4" = 1.96 gal

PURGING INFORMATION

Purging Method: ______ Start Purging: ______ End Purging ______

	Temp. (°F)	pH (S.U.)	Cond.	Turbidity (NTUs)	Clarity
Beginning					
Well Volume 1					
Well Volume 2					
Well Volume 3					
Well Volume 4					

Total Volume Purged (Gal): ______ Remarks: ______

SAMPLING INFORMATION

		Container Size/Type	Analysis	Preservative
Sampling Date/Time:				
Sampling Method:				
Sample Storage:				
Laboratory:				
Transporter:				

Remarks: ______

APPENDIX B

CHECKLIST FOR WELL SILTING

Appendix B
Checklist for Well Silting

Well No.	Depth at which 10% of screened interval is blocked (from TOC)	Does well need redevelopment? (Measured well depth is < min)
SW-1	20.47	
SW-2R	32.46	
SW-3	30.78	
SW-4	30.05	
SW-5	29.37	
SW-6	31.25	
SW-7	19.46	
SW-8	19.48	
SW-9	17.09	
SW-10	19.88	
SW-11	12.89	
SW-12	12.9	
SW-13	12.95	
SW-14	11.89	
SW-15	10.93	
SW-16	13.63	
SW-17	17.5	
SW-18	21.5	
SW-19	17	
SW-20	23.5	
MW-21	9.5	
MW-22	11.5	

NOTE: If well needs redevelopment, it must be completed prior to the next required sampling event.

APPENDIX N

POLLUTION CONTROL FORM

Form R-408 (1-72)

POLLUTION CONTROL FORM

SUBMIT REQUEST PROMPTLY TO POLLUTION COORDINATOR

UNIT OR AREA:

TYPE AND STRENGTH OF MATERIAL:

ESTIMATED QUANTITY:

REQUEST DISPOSAL TO:

PROPOSED DATE OF DISPOSAL:

*START OF RELEASE, TIME AND DATE:

*COMPLETION OF RELEASE, TIME AND DATE:

REMARKS:

SUPERVISOR

RECOMMENDATIONS:

POLLUTION COORDINATOR

APPROVED ______________________ ASSISTANT PLANT MANAGER

*In case of upset on operating units necessitating an unusual release of pollutants, Waste Treating Plant Supervisor must be alerted immediately, and this form filed in confirmation.

APPENDIX O

CONTINGENCY PLAN

Emergency Response Plan:

The Motiva Enterprises, LLC (Motiva) Emergency Response Plan is designed to meet both operational and regulatory compliance objectives. The plan integrates components of emergency response procedures developed for operational needs and a variety of compliance needs including the requirements of the Solid Waste Regulations.

Included in this section of the application as required by the October 28, 2004 Notice of Deficiency is updated information describing the contingency plans and procedures currently being utilized by Motiva. This section includes the outline of the information that would be immediately available in electronic format to both Motiva employees and outside agencies should a situation arise that required the implementation of the emergency procedures. The complete plan is maintained onsite in an electronic format and is available for review.

HOW TO USE THIS PLAN

PREFACE

The MOTIVA ENTERPRISES Emergency Response Plan (ERP) is designed to meet both operational and regulatory compliance objectives. This section describes how the Plan is organized to meet these objectives and important features of the document.

HOW TO USE THIS PLAN

The Emergency Response Plan is organized into twelve different sections. All related appendix materials are included at the end of the Manual. The primary sections are:

1 Introduction

2 Refinery Hazards

3 Incident Command System

4 Detection, Alarm and Notification Procedures

5 Emergency Response Training, Equipment, and Mutual Aid

6 Emergency Response Health and Safety Concerns

7 Emergency Response Team Procedures

8 Evacuation, Accountability, and Sheltering

9 Terminating the Incident

10 Refinery Security

11 Media Relations

12 Hurricane Planning

Appendix:

Appendix A – Emergency Contact Numbers
Appendix B – Regulatory Compliance Matrix
Appendix C – Definitions and Abbreviations
Appendix D – Incident Management Checklists
Appendix E – Mutual Aid Contacts and Equipment/Material List
Appendix F – Accountability and Evacuation Procedure
Appendix G – Corporate Reporting Requirements
Appendix H – Emergency Response Equipment
Appendix I – Hazardous Wastes and Their Hazards
Appendix J – Personnel Accountability System

The Table of Contents refers the user to numbered Section Tabs. Each page is numbered, dated, and carries the title of the section or appendix you are reading.

Each section organizes information into three general levels, which are signified by different typefaces. For example, UNDERLINED ALL-CAPS is used to signify the beginning of a major topic, **Boldface** is used to indicate a subheading under a major topic. When third-level information is provided, subheadings are usually indicated by indenting.

When specific action items or important points appear in the text, they are signified by a box symbol "θ" which may be followed by additional action items in a step-by-step outline form.

KEY SIGNAL WORDS

Three types of special information are conveyed to the user through highlighted notes within the written text. Watch for the signal words, **DANGER, CAUTION,** and **NOTE** – they carry special meaning for the user.

DANGER indicates information that could result in death or serious injury to the employee. For example, the Bomb Threat Procedure states:

κ **DANGER**: Never attempt to move or disarm any object which appears suspicious or is a suspected explosive device.

CAUTION indicates important information or data that employees should be aware of to perform their duties safely. For example:

σ **CAUTION**: Firefighting protective clothing is not designed to provide any substantial chemical protection.

NOTE includes important operational information that helps explain why a particular recommendation in the text should be followed. Notes usually convey real world practical operating experience to the user. For example:

* **NOTE**: Critical operations and operations personnel will be designated by the Shift Superintendent.

EMERGENCY RESPONSE PLAN REGISTRATION

- Each copy of the Emergency Response Plan has an identification number on the inside cover.
- All recipients of this Emergency Response Plan must complete and return the Receipt Form to the Safety, Health and Environmental Department. This action is necessary to acknowledge receipt of the Emergency Response Plan and to register the Plan for future updates and change distributions.
- If the Receipt Form is not returned, future updates will not be distributed and the assigned Emergency Response Plan will be recalled.
- Copies of the Emergency Response Plan are to be distributed to the individuals listed in Table 1-1.

RECORD OF CHANGES

All pages within the Emergency Response Plan are printed with a Section identifier and the date of publication/release to facilitate the insertion of future updates. When a change is to be made within the Plan, a "Change Update" will be distributed by the Safety, Health and Environmental Department outlining the specific instructions for inserting new or replacement pages within the binder. All updates should be immediately inserted in the Plan and the outdated pages discarded.

A record sheet summarizing the date, responsible party, and the parts of the Plan affected by any respective changes and corrections is shown on the next page. This record sheet should be used to track that all copies of the Emergency Response Plan are maintained in an accurate, up-to-date manner.

EMERGENCY RESPONSE PLAN
RECORD OF CHANGES

Amendment Number	Section(s) Affected	Date
1	All- updated Emergency Response Contractor form RTFC to IES	12/01/99
	3-9 Finance Section Chief changed from Manager of Acct. – Supervisor Financial Services	12/01/99
	4-7 Added Radio Protocols to detection, Alarm and Notification Procedures	12/01/99
	Appendix A-1, A-2, A-3, A-4, A-5, A-7, A-8 to reflect changes in plan sections and Personnel changes	12/01/99
	Appendix A-10 added Convent Refinery Radio Fleet Map	12/01/99
2	Emergency Response Plan Distribution List	5/31/01
	Appendix D – SHE Commander Aide Checklist	8/9/00
3	Incorporated Hazardous Waste Contingency Plan Requirements as follows:	11/3/03
	How to Use This Plan pg 1 -- added Appendix H and Appendix I; pg 5 -- added LDEQ	11/3/03
	1-2 Revised Regulatory Compliance to include reference to LAC 33:V.1513; 1-6 Revised Plan Updates and Revisions	11/3/03
	2-6 Added description of Hazardous Waste Facilities	11/3/03
	Appendix A-3 to include home and office addresses of EOC Commanders	11/3/03
	Appendix B to include regulatory matrix for Hazardous Waste Contingency Plan	11/3/03
	Appendix F to include evacuation map and reflect new Accountability phone number	11/3/03
	Added Appendix H	11/3/03
	Added Appendix I	11/3/03
4	Section 3 – Changes made to titles and responsible persons for EOC Staff and Incident Command Staff, references to Site Commander changed to Incident Commander	11/3/03
	Appendix A – Changes to titles and responsible persons for EOC staff and Incident Command Staff, phone number additions and changes for EOC Staff, Incident Command Staff, and VERT members, additions and changes to VERT members	11/3/03
5	Section 8 - Sorrento evacuation plan and map was added	2/01/05
6	Appendix A – Changes to titles and responsible persons for EOC staff and Incident Command Staff, phone number additions and changes for EOC Staff, Incident Command Staff, and VERT members, additions and changes to VERT members	2/01/05
7	How to use plan was reviewed. Changes were made to distribution list. Date In footer was updated to Indicate review.	2/01/05
8	Reviewed and updated Table of Contents to Include Appendix J and established link to Appendix	12/26/05
9	Reviewed How To Use This Plan and Updated review date.	12/26/05

10	Reviewed Section 1 – Introduction, updated review date and added field accountability for personnel participating In field emergency response activities	12/26/05
11	Reviewed and updated Section 4 – Detection, Alarm and Notification Procedures to reflect changes from Site Command to On Scene Command	12/26/05
12	Reviewed Section 8 -- Evacuation, Accountability, and Sheltering, changed Site Commander to On Scene Commander	12/28/05
13	Reviewed and made minor changes to the following: Section 1 - Introduction Section 2 - Refinery Hazards Section 5 - Emergency Response Training, Eqiupment and Mutual Aid Section 6 - Emergency Response Health & Safety Concerns Section 7 - Emergency Resposne Team Procedures Section 9 - Terminating the Incident Section 10 - Refining Security Section 11 - Media Relations Appendix A - Emergency Contact Numbers Appendix B - Regulatory Compliance Matrix Appendix C - Emergency Response Abbreviations Appendix D - Incident Management Checklists Appendix E - Mutual Aid Tables Appendix F - Accountability & Evacuation Procedures Appendix G - Corporate Reporting Requirements Appendix H - Emergency Response Equipment Appendix I - Hazardous Wastes and Their Hazards Appendix J - Personnel Accountability System	4/25/06

Table 1-1
Emergency Response Plan Distribution List

Copy Number	Distribution		
1	Refinery Manager	Doug Quinn	ADMIN
2	External Relations Manager	Gary Miller	ADMIN
3	Manager Production Assurance	Brian Meck	ADMIN
8	FILE COPY	File Copy Room	FIRE HOUSE
9	Emergency Operations Center	Louisiana Room	ADMIN
11	Security Control Center		STORE HOUSE GATE
12	Control Room #3		
13	Control Room #1		
14	Emergency Response Coordinator	Donald Faucheux	FIRE HOUSE
16	Medical		MEDICAL
17	IES Captain office – MOTIVA ENTERPRISES		
18	Shift Superintendent Office		
19	Saint James Parish EOC		P.O. Box 83 Convent, LA 70723
20	IES Duty Chief – Motiva Enterprises	Danny Garcia	FIRE HOUSE
28	Ascension Parish Office of Homeland Security and Emergency Response		828 S. Irma Boulevard, Suite 104 Gonzales, LA 70737
30	CB-4		FIRE HOUSE
34	Laboratory	George Arnold	LAB
37	SPARE	File Room	FIRE HOUSE
39	Equiva Services Crisis Management		
40	SPARE	File Room	FIRE HOUSE
41	Louisiana Department of Environmental Quality	Office of Environmental Services, Permits Division	P.O. Box 4313 Baton Rouge, LA 70821-4313

APPENDIX P

PERSONNEL TRAINING PLAN

MOTIVA ENTERPRISES, LLC
CONVENT REFINERY
CONVENT, LOUISIANA
GD-093-1513

PERSONNEL TRAINING PLAN
WASTEWATER TREATMENT
SURFACE IMPOUNDMENTS

JUNE 2005

PREPARED BY:

C-K ASSOCIATES, LLC
17170 PERKINS ROAD
BATON ROUGE, LOUISIANA 70810
(225) 755-1000

C-K ASSOCIATES PROJECT NO. 1983W

TABLE OF CONTENTS

1.0 GENERAL

The solid waste training program for the WWT Ponds will include the regulatory training requirements for both permanent and new facility employees having responsibilities associated with the WWT Ponds. Detailed job descriptions, course outlines, and personnel training records are maintained at Motiva Enterprises, LLC.

1.1 Purpose

The purpose of this program is to familiarize plant personnel with proper solid waste management procedures, emergency procedures, emergency equipment, and emergency systems relevant to the positions in which they are employed.

1.2 Requirements

All employees who will be involved in operating or maintaining the facilities must be fully trained in solid waste management and emergency procedures.

No employee will be allowed to work in an unsupervised capacity at the facilities prior to completion of this training program.

For new employees whose assignment will involve solid waste management at the WWT Ponds, training must be successfully completed within six months of employment at the site.

1.3 Training Program

The training program provides an overview of solid waste management procedures at the WWT Ponds and emphasizes the emergency protocol, response actions, and responsibilities necessary during an emergency. Annual review is required for all personnel in positions associated with hazardous waste management. Participation in the annual review ensures that Motiva Enterprises, LLC employees will be kept up to date with any changes in the Wastewater Treatment Surface Impoundments Training Plan, waste facilities, emergency procedures, and/or any other relevant issues.

1.4 Format

The training programs will include formal classroom training, self-guided learning modules, audio and visual aids, and on-the-job training.

2.0 INSTRUCTORS

The solid waste training program is directed by the Supervisor of Environment Health and Safety (EH&S). Classroom instructors will be knowledgeable in the specific fields being taught and have experience in solid waste management.

3.0 TRAINING FREQUENCY FOR FACILITY PERSONNEL

Facility personnel will participate in an annual review of the solid waste training program.

4.0 TRAINING RECORDS

Records documenting the solid waste training given to each employee including contractor personnel will be maintained at the site. These records will include a description of both introductory and continuing training give to each employee.

Personnel training records will be maintained for at least three years after final closure of the facilities.

Training records will be maintained at Motiva Enterprises, LLC for a period of three years for personnel who leave employment.

5.0 FACILITY PERSONNEL RECORDS

The key job descriptions, including job title, assigned unit, location, basic function, specific duties, and responsibilities as related to solid waste management, and required qualifications for each position related to the WWT Ponds, can be found at the Motiva Enterprises, LLC site.

APPENDIX Q

FACILITY OPERATIONAL PLAN

MOTIVA ENTERPRISES, LLC
CONVENT REFINERY
CONVENT, LOUISIANA
GD-093-1513

FACILITY OPERATIONAL PLAN
WASTEWATER TREATMENT
SURFACE IMPOUNDMENTS

JUNE 2005

PREPARED BY:

C-K ASSOCIATES, LLC
17170 PERKINS ROAD
BATON ROUGE, LOUISIANA 70810
(225) 755-1000

C-K ASSOCIATES PROJECT NO. 1983W

TABLE OF CONTENTS

LIST OF EXHIBITS

1.0 INTRODUCTION

The Motiva Enterprises, LLC (Motiva) Convent Refinery Wastewater Treatment System includes five industrial solid waste surface impoundments (WWTU). This Facility Operational Plan has been prepared according to LAC 33:VII.521.H and LAC 33:VII.713.D. This document describes the operations of the entire Motiva Convent Refinery, including Refinery safety and security, and a description of the wastewater treatment process.

Approximately 1,400 acres of the 3,900-acre property are involved in the actual petroleum refining activities, including the surface impoundments. Motiva operates in Sections 9, 10, 11, and 12, in Township 11 South, Range 3 East of St. James Parish. The facility is located on the Ascension-St. James Parish boundary line along the east bank of the Mississippi River between Mile Station No. 161 and No. 162. The refinery is located on River Road, approximately one-half mile north of the intersection of Highways 44 and 70, approximately nine miles northwest of Convent, Louisiana, and two miles north of the Sunshine Bridge.

2.0 FACILITY OPERATIONS

2.1 Surface Impoundment Design

The WWTU are designed to collect process wastewater, including ballast water, water in crude oil, stripped sour water from the stripper units, biosludge landfarm leachate, cooling tower and boiler blowdown, and contaminated storm water, from the developed refinery site. Waters drain into each impoundment by gravity flow. The five WWTU include Aeration Basins No. 1 and No. 2, the Recycle Pond, the South Surge Pond, and the East Surge Pond.

Two wastewater treatment surface impoundments (the Recycle Pond and the South Surge Pond) are lined with a large deposit of natural clay (Maximum Coefficient of Permeability 1×10^{-7} cm/sec) approximately ten feet thick beneath the units. The East Surge Pond, which serves as an overflow location for the South Surge Pond in the event of heavy rainfall or flooding, is lined with a three-foot thick, recompacted clay liner and a 60-mil HDPE flexible membrane. The other two units, Aeration Basins No. 1 and No. 2, are fitted with synthetic liners placed over 12 inches of sand. Within the sand is a three-inch perforated pipe. The natural clay unit is directly below the sand and piping. The clay unit will prevent leachate from entering the underlying soil and filtering into the water table located approximately 12 feet bgs. A levee constructed of a compacted fill contains the wastewater, while a two-foot freeboard prevents overflowing, even during adverse weather conditions.

A difference in elevation of approximately two feet exists between the highest surface water level in the storm water runoff channels and the elevation of all of the surface impoundments. Positive drainage is maintained on the site due to its flat topography; therefore, no special dewatering plan, facilities, or control systems are necessary.

2.2 Wastewater Stream

The impoundments are designed to collect and treat process wastewater, including ballast water, water in crude oil, stripped sour water from the stripper units, biosludge landfarm leachate, cooling tower and boiler blow down, and contaminated storm water, from the developed refinery site. Motiva is proposing to receive off-site wastewater from companies that generate wastes which are similar in nature to what is generated within the refinery. These companies would typically be owned and/or operated by an Alliance company but may also include companies associated with Alliance company activity. These wastes would include wastewater from offsite petroleum refineries, petroleum pipelines, gas storage and treatment facilities, and bulk storage facilities which store petroleum and/or vegetable oil products.

Wastewater Treatment Process

Wastewaters from the refinery are routed to one of the two API Separators for the settling of particulate matter and skimming of free oil. Following separation in the APIs, wastewater is routed to the Equalization Tank (37T-316). Under high flow conditions, the flow can also be routed to the two Storm Surge Tanks (37T-314 and 37T-315) or the Upset Tank (37T-317).

Flow in excess of the hydraulic capacity of the APIs is automatically routed to the Storm Surge Sump and is either pumped into the refinery equalization/surge area, or is routed by gravity into the South Surge Pond for temporary storage. It should be noted that if API #2 is out of service, flow which would normally be routed through this API is pumped directly via the Storm Surge Sump to the equalization/surge area.

From the equalization/surge area tanks, the wastewater is routed into the Staged Activated Sludge Treatment Unit (SASTU) unit and from there into one of the two in ground aeration basins. Under normal operation, two stages of activated sludge treatment will be employed, first-stage treatment in the SASTU (37T-324 and 37T-325) and second-stage treatment in one of the two existing Aeration Basins No. 1 and No. 2. Treated water from the aeration basins is divided between three clarifiers (37V-350, -351, or -352) for solid/liquid separation. Clarified water from the clarifiers is directed to the Recycle Pond where it is stored prior to being pumped through pressure sand filters and discharged through Outfall 001 to the Mississippi River.

2.3 Facility Recordkeeping

Motiva performs daily inspections of its surface impoundments to detect evidence of leaks, strong odors, or structural failure, and to verify that a minimum freeboard of two feet is maintained. The Daily Inspection Checklist, which allows for additional comments and observations of the inspector, is included as Exhibit 1 of this Plan.

To ensure that the Solid Waste Surface Impoundments are operating properly, these facilities are inspected on a daily basis and after storms. If a leak in any of the surface impoundments is detected, the Louisiana Department of Environmental Quality (LDEQ) will be notified immediately.

The following records will be maintained for the WWTU:

- Inspection Schedule
- Annual Solid Waste Generator's Report
- Record of Correspondence with LDEQ
- Groundwater Monitoring Reports
- Record of LDEQ inspections
- Existing Solid Waste Permits
- Louisiana Solid Waste Rules and Regulations
- Solid Waste Permit Applications
- Solid Waste Permit Modifications
- Contingency Plan and Emergency Procedures
- Personnel Training Documentation
- Quality Assurance/Quality Control (QA/QC) Records
- Monitoring, Testing and Analytical Data

All solid waste records shall be maintained on-site for the life of the facility and will be kept for at least ten years after closure.

2.4 Vector, Dust, Litter, and Odor Control

The wastewater stream and the type of sludge developed in the surface impoundments do not attract pathogen transmitting organisms; therefore, excessive vector control is not required. The physical nature of the solid waste generated and disposed in the surface impoundments is such that the waste will not become airborne as dust nor will its trash require litter control. Daily inspections are performed at the surface impoundments for structural stability and excessive odors. Based on Motiva's experience, there are no odors associated with the surface impoundments. However, if odors do exist, the safest and most effected method to eliminate the odors will be implemented.

3.0 SAFETY AND SECURITY

3.1 Refinery Safety

The operational personnel at the site are required to wear protective equipment, such as hard hats, safety glasses, gloves, and other equipment, as necessary for protection against accidental injury as required by the Occupational Safety and Health Administration (OSHA). In the unlikely event that a major incident arises due to the operation of the Wastewater Treatment System, elements of the Contingency Plan will be activated. Riverview Medical Center, located within ten miles of the Refinery site, will be used if off-site medical services are required.

3.2 Fire Protection

The wastewater addressed in this application is not flammable. No situations are known which might cause the surface impoundments to be the source of a fire emergency. Emergency plans to deal with fire, including each building's fire exits and established locations for fire extinguishers are maintained in accordance with OSHA requirements. Although Motiva is equipped to handle emergencies on-site, if outside assistance is required, the Union-Convent Volunteer Fire Department will be contacted. For additional information, please refer to Motiva's Contingency Plan.

3.3 Safety Measures for Emergency Situations

All equipment utilized by Motiva's WWTU is routinely inspected and maintained to prevent breakdown and ensure the containment of waste. In the event of equipment failure, repairs are either performed immediately on-site or equipment is leased until repairs can be completed. However, any breakdowns which result in the release of solid waste will be reported to LDEQ promptly by telephone. In the event of an emergency situation, normal operations of the surface impoundments will be shut down and wastewater discharges stopped during clean-up operations.

Operations at the Refinery continue as usual during most types of inclement weather. Severe weather conditions, such as hurricanes, may result in the temporary closure of the surface impoundments. Decisions to close the impoundments during inclement weather are made by the facility management personnel.

3.4 Employee Safety and Training

Motiva requires all employees to undergo a rigorous safety training program as it relates to the overall safety requirements of the Convent Refinery and the specific safety requirements dictated by the employee's job assignment. Personnel safety meetings are held weekly. The Refinery also has emergency plan to deal with employee safety, health, and medical treatment in case of accidental job-related injury.

Employees who are responsible for the operations of the WWTU are required to be knowledgeable of the safety requirements and must be able to perform related tasks at all times. Additional information regarding personnel training, safety measures and emergency procedures is addressed in Motiva's Personnel Training Plan and Contingency Plan.

3.5 Refinery Security

The Motiva site is completely surrounded by a seven-foot chain link fence to prevent unauthorized ingress or egress, except by willful entry, and to prevent entry by domestic livestock. The site's fenced perimeter is sufficiently cleared and lighted to allow access by contracted security patrol by vehicle or by foot.

Vehicles entering or leaving the facility must pass through the main gate. Access to the site is through the main gate which is guarded 24 hours per day, 365 days per year by contracted security guards. The main access gate is a locking sliding security gate. If the security personnel must leave the guardhouse, the gate is closed and locked. A visitors' parking lot is located outside the main gate. The guard will stop and document all vehicles, contractors, visitors, and refinery personnel entering and exiting the facility. All other gates are closed and locked when not in use.

Refining operations are continuous; hence, the facility is always manned. Unauthorized persons may not gain entrance into the facility without being observed by Refinery personnel.

EXHIBITS

EXHIBIT 1

DAILY INSPECTION CHECKLIST

The Daily Inspection Checklist is to be supplied by Motiva

APPENDIX R

DAILY INSPECTION CHECKLIST

SAMPLE

Daily Inspection Checklist

Inspector: ______________________________
Date: ______________________________
Time: ______________________________

	Aeration Basin 1		Aeration Basin 2		Recycle Pond		South Surge Pond		East Surge Pond	
1. Is there any evidence of leaks around the impoundments?	Y	N	Y	N	Y	N	Y	N	Y	N
2. Is there any evidence of strong odors around the impoundments?	Y	N	Y	N	Y	N	Y	N	Y	N
3. Is there any evidence of structural failure (*i.e.*, slope failure) around the impoundments?	Y	N	Y	N	Y	N	Y	N	Y	N
4. Is there any evidnece of erosion around the impoundments?	Y	N	Y	N	Y	N	Y	N	Y	N
5. Is there less than two feet of freeboard around the impoundments?	Y	N	Y	N	Y	N	Y	N	Y	N

Return completed checklist to SH&E.

If any of the above questions were answered Y, contact SH&E immediately.

Comments and Observations

____
____
____
____
____
____
____
____
____

____
Signature

APPENDIX S

DAILY FIELD LOG

C-K ASSOCIATES, INC.

DATE			
SHEET		OF	

DAILY FIELD LOG

PROJECT NAME:	PROJECT NO.:
FIELD ACTIVITY SUBJECT:	
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:	
VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
C-K REPRESENTATIVE ON SITE:	

APPENDIX T

CHAIN-OF-CUSTODY FORM

C-K ASSOCIATES • INC
ENVIRONMENTAL & ENGINEERING CONSULTANTS

CHAIN OF CUSTODY AND ANALYTICAL REQUEST RECORD

17170 PERKINS ROAD • BATON ROUGE, LA 70810
PH (225) 755-1000 • FAX (225) 751-2010

Page _____ of _____

CLIENT: ________ P.O. NUMBER: ________ SAMPLED BY: ________

PROJECT NO.: ________ LABORATORY*: ________ DATE: ________

SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	NO. OF CONTAINERS	PRESERVATIVE	ANALYSES AND INSTRUCTIONS

Relinquished by: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Collection witnessed by: (Signature, if required)	Date	Time	Method of Payment		Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time

*Please send results and invoice to the attention of ________________ In our ☐ Baton Rouge, ☐ Lake Charles, ☐ Shreveport office.

WHITE COPY TO ACCOMPANY SAMPLE • RETAIN YELLOW COPY FOR FILES • RETAIN PINK COPY FOR FIELD SUPERVISOR

APPENDIX U

CLOSURE COST ESTIMATES

2005 Closure Cost Estimate
WWT Ponds

Closure Procedures	Cost
Prepare and Submit Closure Plan to the the LDEQ	$9,223
Mobilization/Demobilization	$24,643
Dewater WWT Ponds	$40,044
Remove Sludge and 6 Inches of Soil	$332,712
Load/Haul Sludge and Soil	$555,074
Dispose Sludge and Soil	$1,774,463
Collect Soil Samples	$1,331
Analyze Soil Samples	$1,774
Backfill and Return to Original Grade	$3,404,446
Apply Top Soil	$49,057
Seed and Fertilize	$18,482
Abandon Monitoring Wells	$25,875
Total Cost..	$6,237,112

APPENDIX V

FINANCIAL ASSURANCE DOCUMENTATION AND LIABILITY INSURANCE

Shell Central Finance
Jim Zaleski
P. O. Box 2463
Houston, TX 77252-2463
Tel + 1 713 241 5529
Email: jim.zaleski@shell.com

STANDARD OVERNIGHT

Louisiana Department of Environmental Quality
ATTN: Office of Management & Finance,
Financial Services Division
P. O. Box 4303 ..
Baton Rouge, LA 70821-4303

March 28, 2006

Dear Sir:

Attached is Shell Oil Company's financial test to demonstrate financial responsibility in 2006 for solid waste facilities in Louisiana in support of Shell owned/operated or guaranteed facilities (Shell Chemical LP- Norco West Site; Equilon Enterprises LLC - Metairie Plant; and Motiva Enterprises LLC Norco and Convent Refinery) as required by LAC 33:VII 727. A. 1 and A. 2. This submission updates those provided on March 28, and April 21, 2005.

As noted last year Shell Oil Company now owns 100% of Equilon and Equilon is now doing business as Shell Oil Products US.

Shareholder's equity shown on page 5 is not identical to the amount displayed in the audited financial statements because it has been adjusted for goodwill/intangibles and software, a total of $3,569,000,000 ($13,435,000,000 - $3,569,000,000 = $9,866,000,000). The letter from the Independent Accountants addresses this matter.

Following is a recap of the attachments:

1. Financial assurance Letter;
2. Guaranty to Motiva Enterprises LLC – Norco and Convent Refineries for Closure/Post-Closure and Liability Coverage;
3. Guaranty to Equilon Enterprises LLC – Metairie Plant for Closure and/or Post-Closure and Liability Coverage;
4. Guaranty to Shell Chemical LP-Norco Chemical Plant for Closure and/or Post-Closure and Liability Coverage;
5. 2005 Shell Oil Company Financial Review, which includes audited financial statements and auditor's opinion;
6. Special Independent Accountants Report in support of item 1.
7. Certificate of Delegation to Vice President Finance and Controller.

Please do not hesitate to contact me if there are any questions (713 241-5529).

Sincerely,

Jim Zaleski
Shell Central Finance
For Itself and as an Agent of Shell Oil Company

DISTRIBUTION LIST

United States Environmental Protection Agency

Regional Administrator - Region VI
ATTN: RCRA Financial Requirements
1445 Ross Avenue
Dallas, TX 75202-2733

PriceWaterhouseCoopers LLP

Colby Warr

Shell Chemical LP

Norco Chemical Plant – Fred Goodson – STANDARD OVERNIGHT
Norco Chemical Plant – Vickie Vicknair – STANDARD OVERNIGHT

Motiva Enterprises LLC

Convent Refinery – Bill Paul – STANDARD OVERNIGHT

Shell Lubricants

Brenda Clark

Shell Oil Company
Vice President Finance and Controller
P. O. Box 2463
Houston, TX 77252-2463
United States of America

March 28, 2006

Louisiana Department of Environmental Quality
ATTN: Office of Management & Finance,
Financial Services Division
P. O. Box 4303
Baton Rouge, LA 70821-4303

Dear Sir:

I am the I am the Chief Financial Officer of Shell Oil Company, P. O. Box 2463, Houston, TX 77252-2463. This letter is in support of this firm's use of the financial test to demonstrate financial responsibility for liability coverage and closure and/or post-closure care as specified in LAC 33:VII.727.A.1 and A.2.

1. The firm identified above is the permit holder of the following solid waste facilities, whether in Louisiana or not, for which liability coverage is being demonstrated through the financial test specified in LAC 33:VII.727.A.1. The amount of annual aggregate liability coverage covered by the test is shown for each facility: None.

2. The firm identified above is the permit holder of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for closure and post-closure care is demonstrated through a financial test similar to that specified in LAC 33:VII.727.A.2 or other forms of self-insurance. The current closure and post-closure cost estimates covered by the test are shown for each facility: None.

3. This firm guarantees through a corporate guarantee similar to that specified in LAC 33:VII.727.A.1 and 2 liability coverage, closure and post-closure of the following solid waste facilities, whether in Louisiana or not, of which Equilon Enterprises LLC*, Motiva Enterprises LLC and Aera Energy LLC, the permit holders are subsidiaries of this firm.

   The amount of annual aggregate liability coverage covered by the guarantee for each facility and/or the current cost estimates for the closure and/or post-closure care so guaranteed is shown for each facility:

*Doing business as Shell Oil Products US

A. SHELL CHEMICAL LP

NORCO CHEMICAL PLANT - WEST SITE
Solid Waste Site No. GPD-089-2265 (West Site)
P. O. Box 10
Norco, LA 70079

Aggregate Liability Coverage

$1,000,000

Solid Waste Permit Numbers	Closure Cost Estimate	30-Year Post-Closure Cost Estimate
***P-019 (Incinerator)	$ 151,765	0
C-0606 (Nickel Pit)	0	0
Total	$ 151,765	$ 0

NOTE: *** Estimated closure date - 2010

B. EQUILON ENTERPRISES LLC*

METAIRIE PLANT
Solid Waste Site No. GD-051-1730
Permit No. P0194
P. O. Box 7400
Metairie, LA 70010

Aggregate Liability Coverage

$1,000,000

Solid Waste Permit Numbers	Closure Cost Estimate	30-Year Post-Closure Cost Estimate
*LA 0003140 (NPDES Oxidation Ponds)	$ 2,535,325	0

*NOTE: Estimated closure date - 2006

*Doing business as Shell Oil Products US

JBZ06.100.Louisiana.doc

C. MOTIVA ENTERPRISES LLC

(1) NORCO REFINERY
Solid Waste Site No. GD-089-0359
P. O. Box 10
Norco, LA 70079
Aggregate Liability Coverage $1,000,000

Solid Waste Permit Numbers		Closure Cost Estimate	30 Year Post-Closure Cost Estimate
****PA #492 (New Landfill)		$ 1,225,767	$ 1,023,442
**P-0 114-AI (Landfill)		0	993,864
***P-0268	(SWIB & Aero Basin)	33,517,983	1,101,087
*---	(Refinery Soils)	334,209	127,052
Total		$ 35,077,959	$ 3,245,445

NOTE: * Estimated closure date - unknown
** Estimated closure date – Closed. Post Closure: 2027
*** Estimated closure date - 2010
**** Estimated closure date – 2010

(2) CONVENT REFINERY
Solid Waste Site No. GD-093-1513
Highway 44
Convent, LA 70723
Aggregate Liability Coverage $1,000,000

Solid Waste Permit Numbers	Closure Cost Estimate	10-Year Post-Closure Cost Estimate
*P-0126 Surface Impoundment	$ 6,427,036	$1,336,369
** P-0246 Biosludge Farm	18,930	36,084
Total	$ 6,445,966	$1,372,453

NOTE: * Estimated closure date – 2024
** Estimated closure date - 2032

Aera Energy LLC North Belridge Landfill 19590 7th Standard Road McKittrick, CA 93251 Facility No. 15-AA-0067	Aggregate Liability Coverage $1,000,000 30-Yr Post-Closure Cost Estimate $ 166,632

4. This firm is the owner or operator of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for liability coverage, closure and/or post-closure care is not demonstrated either to the U.S. Environmental Protection Agency or to a state through a financial test or any other financial assurance mechanism similar to those specified in LAC 33:VII.727.A.1 and/or 2. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility: None.

This firm is not required to file a Form 10-K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firms independently audited, year-end financial statements for the latest completed year, ended December 31, 2005.

PART C. LIABILITY COVERAGE, CLOSURE AND/OR POST-CLOSURE CARE ALTERNATIVE II

1.	Sum of current closure and/or post-closure cost estimates (total of all cost estimates listed above)	$ 48,995,545
2.	Amount of annual aggregate liability coverage to be demonstrated	$ 5,000,000
3.	Sum of lines 1 and 2	$ 53,995,545
4.	Current bond rating of most recent issuance of this firm and name of rating service	Aa2 by Moody's AA by Standard & Poor's
5.	Date of issuance of bond	03/30/1999
6.	Date of maturity of bond	04/01/2009
*7.	Tangible net worth (If any portion of the closure and/or post-closure cost estimates is included in the "total liabilities" the firms financial statements, you may add that portion to this line.)	$ 9,866,000,000 (A)
*8.	Total assets in the U.S. (required only if less than 90% of assets are located in the U.S.)	$53,579,000,000 (B)
9.	Is line 7 at least $10 million?	X Yes __ No
10.	Is line 7 at least 6 times line 3?	X Yes __ No
*11.	Are at least 90% of assets located in the U.S.? If not, complete line 12	__ Yes X No
12.	Is line 8 at least 6 times line 3?	X Yes __ No

I hereby certify that the wording of this letter is identical** to the wording specified in LAC 33:VII.727.A.2.i.iv.(e).

Yours truly,

Randy Braud
Vice President Finance and Controller

March 28, 2006

Explanatory footnotes have been added where appropriate.

(A) Shareholders' Equity $13,435,000,000 minus Goodwill/Intangibles $3,569,000,000 = $ 9,866,000,000
(B) Total U.S. Assets $57,148,000,000 minus Goodwill/Intangibles $3,569,000,000 = $ 53,579,000,000

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SOLID WASTE FACILITY
CORPORATE GUARANTEE

FOR LIABILITY COVERAGE, CLOSURE AND/OR POST CLOSURE CARE

Guarantee made this 28th day of March 2006, by Shell Oil Company, a business corporation organized under the laws of the State of Delaware, hereinafter referred to as guarantor, to the Louisiana Department of Environmental Quality, obligee, on behalf of our subsidiaries * Motiva Enterprises LLC – Convent Refinery, Highway 44, Convent, LA 70723 and Norco Refinery, P. O. Box 10, Norco, LA 70079.

Recitals

1. The guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in LAC 33:VII.727.A.2.i.ix.

2. Motiva Enterprises LLC – Norco Refinery and Convent Refinery are the permit holders, hereinafter referred to as permit holders for the following solid waste facilities covered by this guarantee:

   A. Norco Refinery
   Solid Waste Site No. GD-089-0359
   Permit Nos.: PA 492; P-0114-A1; P-0268

   B. Convent Refinery
   Solid Waste Site No. GD-093-1513
   Permit Nos.: P-0126; P-0246

Guarantee is for liability coverage, closure, and/or post-closure as follows:

A. Norco Refinery	
Aggregate Liability Coverage	$ 1,000,000
Closure Cost Estimate	$ 35,077,959
Post-Closure Cost Estimate	$ 3,245,445
B. Convent Refinery	
Aggregate Liability Coverage	$ 1,000,000
Closure Cost Estimate	$ 6,445,966
Post-Closure Cost Estimate	$ 1,372,453

3. "Closure plans," as used below refers to the plans maintained as required by the Louisiana Administrative Code, Title 33, Part VII, for the closure and/or post-closure care of the facility identified in Paragraph 2 above.

* Shell Oil Company has a substantial business relationship with Motiva Enterprises LLC (see attached).

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4. For value received from permit holder, guarantor guarantees to the Louisiana Department of Environmental Quality that in the event that permit holder fails to perform closure and post-closure care of the above facility in accordance with the closure plan and other permit requirements whenever required to do so, the guarantor shall do so or shall establish a trust fund as specified in LAC 33:VII.727.A.2.d as applicable, in the name of permit holder in the amount of the current closure and/or post-closure estimates as specified in LAC 33:VII.727.A.2.

5. For value received from permit holder, guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and accidental occurrences arising from operations of the facility covered by this guarantee that in the event that permit holder fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences arising from the operation of the above-named facilities, or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the coverage limits identified above.

6. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to the administrative authority and to permit holder that he intends to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2., as applicable, in the name of the permit holder, within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless permit holder has done so.

7. The guarantor agrees to notify the administrative authority, by certified mail, of a voluntary or involuntary proceeding under Title 11 (bankruptcy), U. S. Code, naming guarantor as debtor, within 10 days commencement of the proceeding.

8. The guarantor agrees that within 30 days after being notified by the administrative authority of a determination that guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of liability coverage or closure and/or post-closure care, he shall establish alternate financial assurance as specified in LAC 33:VII.727.A.1 and or LAC 33:VII.727.A.2., as applicable, in the name of permit holder unless permit holder has done so.

9. The guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure and or post-closure care, the extension or reduction of the time of performance of closure and/or post-closure or any other modification or alteration of an obligation of the permit holder pursuant to the Louisiana Administrative Code, Title 33, Part VII.

10. The guarantor agrees to remain bound under this guarantee for as long as the permit holder must comply with the applicable financial assurance requirements of LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2 for the above-listed facility except that guarantor may cancel this guarantee by sending notice by certified mail, to the administrative authority and to the permit holder, such cancellation to become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder, as evidenced by the return receipts.

11. The guarantor agrees that if the permit holder fails to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, and obtain written approval of such assurance from the administrative authority within 60 days after a notice of cancellation by the guarantor is received by the administrative authority from guarantor, guarantor shall provide such alternate financial assurance in the name of the permit holder.

12. The guarantor expressly waives notice of acceptance of this guarantee by the administrative authority or by the permit holder. Guarantor expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility permit(s).

I hereby certify that the wording of this guarantee is identical to the wording specified in LAC 33:VII.727.A.2.i.ix. (1), effective on the date first above written.

Effective date: April 1, 2006

Shell Oil Company

Randy Braud
Vice President Finance and Controller

Signed and sealed
in the presence of:

NOTARY PUBLIC

Notary public ________ County

My commission expires 8/20/08

ATTACHMENT A

SUBSTANTIAL BUSINESS RELATIONSHIP

On June 22, 1998, Shell Oil, Texaco and Saudi Arabian Oil Company ("Saudi Aramco") reached agreement on the formation and operational start up of Motiva Enterprises LLC, a Delaware limited liability company. Motiva is a joint venture combining major elements of the three companies' eastern and Gulf Coast United States refining and marketing businesses, including assets previously held by Star Enterprise, a partnership of corporate affiliates of Texaco and Saudi Aramco.

Shell Oil's initial ownership of Motiva of 35 percent was adjusted effective January 1, 2000 to just under 39 percent, with Texaco and Saudi Refining, Inc. each owning just under 31 percent (a final ownership percentage would have been calculated at the end of 2005 - see last paragraph). Shell's net investment in Motiva as of December 31, 2000 was approximately $1.3 billion. Shell's net investment in Motiva as of December 31, 2001 was approximately $1.3 billion. (Shell's Oil's ownership percentage was 30% in 2001.)

Shell's percent equity share of Motiva's Income Before Tax and the corresponding income tax expense is reflected in Shell's Consolidated Statement of Income.

The assets contributed by each party and their affiliates and the covenants and agreements made and entered into by each party and their affiliates in establishing the Motiva venture constitute full consideration given and received by each party, respectively. The relative values of such consideration, as determined in negotiations between the companies, are reflected in such ownership percentages.

Motiva continues to use these assets in the refining and marketing businesses and will market petroleum and other products directly and through independent wholesalers and retailers. Motiva has exclusive rights (through June 2004 and non-exclusive rights through June 2006) to use the Shell and Texaco brands on refined oil product sales in those areas of the United States where Motiva is authorized to conduct its respective businesses.

The transaction for Shell Oil's acquisition of Texaco's interest in Equilon and Shell Oil's and Saudi Refining Inc.'s acquisition of Texaco's interest in Motiva was finalized in early 2002 and was valued at $3.1 billion, comprised of approximately $1.9 billion in cash and the assumption of approximately $1.2 billion of debt and related liabilities. Beneficial ownership change was effective January 1, 2002. In 2002, Equilon is fully consolidated into Shell Oil's financial statements while Motiva continues to be accounted for under the equity method of accounting. As of December 31, 2002 Shell Oil's 50% equity ownership was approximately $1.4 billion.

SOLID WASTE FACILITY
CORPORATE GUARANTEE

FOR LIABILITY COVERAGE, CLOSURE AND/OR POST CLOSURE CARE

Guarantee made this 28th day of March 2006, Shell Oil Company, a business corporation organized under the laws of the State of Delaware, hereinafter referred to as guarantor, to the Louisiana Department of Environmental Quality, obligee, on behalf of our subsidiary * Equilon Enterprises LLC[A] – Metairie Plant, P. O. Box 7400, Metairie, Louisiana 70010.

Recitals

1. The guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in LAC 33:VII.727.A.2.i.ix.

2. Equilon Enterprises LLC – Metairie Plant, is the permit holder, hereinafter referred to as permit holder for the following solid waste facility covered by this guarantee:

   Solid Waste Site No. GD-051-1730
   Permit No. P-194 LA 003140 (NPDES Oxidation Ponds)

Guarantee is for liability coverage, closure, and/or post-closure as follows:

Aggregate Liability Coverage	$1,000,000
Closure Cost Estimate	$2,535,325
Post-Closure Cost Estimate	$ 0

3. "Closure plans," as used below refers to the plans maintained as required by the Louisiana Administrative Code, Title 33, Part VII, for the closure and/or post-closure care of the facility identified in Paragraph 2 above.

4. For value received from permit holder, guarantor guarantees to the Louisiana Department of Environmental Quality that in the event that permit holder fails to perform closure and post-closure care of the above facility in accordance with the closure plan and other permit requirements whenever required to do so, the guarantor shall do so or shall establish a trust fund as specified in LAC 33:VII.727.A.2.d as applicable, in the name of permit holder in the amount of the current closure and/or post-closure estimates as specified in LAC 33:VII.727.A.2.

5. For value received from permit holder, guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and accidental occurrences arising from operations of the facility covered by this guarantee that in the event that permit holder fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences arising from the operation of the above-named facilities, or fails to pay an amount agreed to in settlement of a claim arising from or

* Shell Oil Company has a substantial business relationship with Equilon Enterprises LLC (see attached).

(A) Doing business as Shell Oil Products US

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alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the coverage limits identified above.

6. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to the administrative authority and to permit holder that he intends to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2., as applicable, in the name of the permit holder, within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless permit holder has done so.

7. The guarantor agrees to notify the administrative authority, by certified mail, of a voluntary or involuntary proceeding under Title 11 (bankruptcy), U. S. Code, naming guarantor as debtor, within 10 days commencement of the proceeding.

8. The guarantor agrees that within 30 days after being notified by the administrative authority of a determination that guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of liability coverage or closure and/or post-closure care, he shall establish alternate financial assurance as specified in LAC 33:VII.727.A.1 and or LAC 33:VII.727.A.2., as applicable, in the name of permit holder unless permit holder has done so.

9. The guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure and or post-closure care, the extension or reduction of the time of performance of closure and/or post-closure or any other modification or alteration of an obligation of the permit holder pursuant to the Louisiana Administrative Code, Title 33, Part VII.

10. The guarantor agrees to remain bound under this guarantee for as long as the permit holder must comply with the applicable financial assurance requirements of LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2 for the above-listed facility except that guarantor may cancel this guarantee by sending notice by certified mail, to the administrative authority and to the permit holder, such cancellation to become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder, as evidenced by the return receipts.

11. The guarantor agrees that if the permit holder fails to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, and obtain written approval of such assurance from the administrative authority within 60 days after a notice of cancellation by the guarantor is received by the administrative authority from guarantor, guarantor shall provide such alternate financial assurance in the name of the permit holder.

12. The guarantor expressly waives notice of acceptance of this guarantee by the administrative authority or by the permit holder. Guarantor expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility permit(s).

I hereby certify that the wording of this guarantee is identical to the wording specified in LAC 33:VII.727.A.2.i.ix.(1), effective on the date first above written.

Effective date: April 1, 2006.

Shell Oil Company

Randy Braud
Vice President Finance and Controller

Signed and sealed
in the presence of:

NOTARY PUBLIC

Notary public Harris County

My commission expires 8/30/08

ATTACHMENT A

SUBSTANTIAL BUSINESS RELATIONSHIP

On January 15, 1998, Shell Oil and certain of its subsidiaries and subsidiaries of Texaco Inc. reached agreement on the formation and operational start up of Equilon Enterprises LLC, a Delaware limited liability company. Equilon is a joint venture, which combines major elements of both companies' western and Midwestern United States refining and marketing businesses and their nationwide trading, transportation and lubricants businesses. As of 12/31/01 Shell Oil owned 56 percent and Texaco owned 44 percent of Equilon. (Shell's net investment in Equilon as of December 31, 2001 was approximately $2.7 billion. Shell's 56 percent equity share of Equilon's Income Before Tax and the corresponding income tax expense is reflected in Shell's Consolidated Statement of Income.) The assets contributed by each party and their affiliates and the covenants and agreements made and entered into by each party and their affiliates in establishing the Equilon venture constitute full consideration given and received by each party, respectively. The relative values of such consideration, as determined in negotiations between the companies, are reflected in such ownership percentages.

Equilon continues to use these assets in the refining, marketing, trading, transportation and lubricants businesses and will market petroleum and other products directly and through independent wholesalers and retailers. Equilon has exclusive rights (through June 2004 and non-exclusive rights through June 2006) to use the Shell and Texaco brands on refined oil product sales) in those areas of the United States where Equilon is authorized to conduct its respective businesses.

In the fourth quarter of 2001 Shell Oil signed definitive agreements to acquire Texaco's interest in Equilon, giving Shell Oil 100 percent ownership. The beneficial ownership change was effective January 1, 2002. In early 2002, Shell Oil Company acquired the 44 percent Texaco, Inc. interest in Equilon, which then began doing business as Shell Oil Products US.

SOLID WASTE FACILITY
CORPORATE GUARANTEE

FOR LIABILITY COVERAGE, CLOSURE AND/OR POST CLOSURE CARE

Guarantee made this 28th day of March 2006, Shell Oil Company, a business corporation organized under the laws of the State of Delaware, hereinafter referred to as guarantor, to the Louisiana Department of Environmental Quality, obligee, on behalf of our subsidiary * Shell Chemical LP - Norco Chemical Plant - West Site, P. O. Box 10, Norco, Louisiana 70079.

Recitals

1. The guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in LAC 33:VII.727.A.2.i.ix.

2. Shell Chemical LP - Norco Chemical Plant - West Site, is the permit holder, hereinafter referred to as permit holder for the following solid waste facility covered by this guarantee:

   Solid Waste Site No. GPD-089-2265

Guarantee is for liability coverage, closure, and/or post-closure as follows:

Aggregate Liability Coverage	$1,000,000
Closure Cost Estimate	$ 151,765
Post-Closure Cost Estimate	$ 0

3. "Closure plans," as used below refers to the plans maintained as required by the Louisiana Administrative Code, Title 33, Part VII, for the closure and/or post-closure care of the facility identified in Paragraph 2 above.

4. For value received from permit holder, guarantor guarantees to the Louisiana Department of Environmental Quality that in the event that permit holder fails to perform closure and post-closure care of the above facility in accordance with the closure plan and other permit requirements whenever required to do so, the guarantor shall do so or shall establish a trust fund as specified in LAC 33:VII.727.A.2.d as applicable, in the name of permit holder in the amount of the current closure and/or post-closure estimates as specified in LAC 33:VII.727.A.2.

5. For value received from permit holder, guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and accidental occurrences arising from operations of the facility covered by this guarantee that in the event that permit holder fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences arising from the operation of the above-named facilities, or fails to pay an amount agreed to in settlement of a claim arising from or

* Shell Oil Company has a substantial business relationship with Shell Chemical LP - Norco Chemical Plant - West Site (see attached).

alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the coverage limits identified above.

6. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to the administrative authority and to permit holder that he intends to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2., as applicable, in the name of the permit holder, within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless permit holder has done so.

7. The guarantor agrees to notify the administrative authority, by certified mail, of a voluntary or involuntary proceeding under Title 11 (bankruptcy), U. S. Code, naming guarantor as debtor, within 10 days commencement of the proceeding.

8. The guarantor agrees that within 30 days after being notified by the administrative authority of a determination that guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of liability coverage or closure and/or post-closure care, he shall establish alternate financial assurance as specified in LAC 33:VII.727.A.1 and or LAC 33:VII.727.A.2., as applicable, in the name of permit holder unless permit holder has done so.

9. The guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure and or post-closure care, the extension or reduction of the time of performance of closure and/or post-closure or any other modification or alteration of an obligation of the permit holder pursuant to the Louisiana Administrative Code, Title 33, Part VII.

10. The guarantor agrees to remain bound under this guarantee for as long as the permit holder must comply with the applicable financial assurance requirements of LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2 for the above-listed facility except that guarantor may cancel this guarantee by sending notice by certified mail, to the administrative authority and to the permit holder, such cancellation to become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder, as evidenced by the return receipts.

11. The guarantor agrees that if the permit holder fails to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, and obtain written approval of such assurance from the administrative authority within 60 days after a notice of cancellation by the guarantor is received by the administrative authority from guarantor, guarantor shall provide such alternate financial assurance in the name of the permit holder.

12. The guarantor expressly waives notice of acceptance of this guarantee by the administrative authority or by the permit holder. Guarantor expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility permit(s).

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I hereby certify that the wording of this guarantee is identical to the wording specified in LAC 33:VII.727.A.2.i.ix.(1), effective on the date first above written.

Effective date: April 1, 2006.

Shell Oil Company

Randy Braud
Vice President of Finance and Controller

Signed and sealed
in the presence of:

NOTARY PUBLIC

Notary public Harris County

My commission expires 8\30\08

ATTACHMENT A

SUBSTANTIAL BUSINESS RELATIONSHIP

On July 1, 2000 Shell Chemical Company a subsidiary of Shell Oil Company was converted into a limited partnership called Shell Chemical LP. Shell Chemical LP is organized under the laws of the state of Delaware. Chemical assets previously owned by Shell Oil Company have been transferred to Shell Chemical LP. Shell Oil Company owns directly or indirectly greater than 90% of Shell Chemical LP and serves as general partner.

The income and assets and liabilities of Shell Chemical LP are accounted for on an account-by-account basis in the financial records of Shell Oil Company. Shell Chemical LP assets are approximately $5.7 billion of Shell Oil Company's assets of $69.1 billion (12/31/05). Shell Chemical LP's income was a gain of approximately $13 million of Shell Oil Company's year-end 2005 income of $6.1 billion.

Shell Chemical LP will continue to use all or the vast majority of the assets formerly held by Shell Oil Company in the operations of its Chemical business.

The value received by Shell Oil Company, in providing this guarantee, is the reduced cost and thus higher income by not incurring alternative costs of insurance, letter of credit, surety bond, etc.

SHELL OIL COMPANY

CERTIFICATE

I, H. A. Pineda, Assistant Secretary of SHELL OIL COMPANY, a Delaware corporation (the "Company"), DO HEREBY CERTIFY that the following is a true and correct resolution of the Board of Directors of the Company, and that said resolution is in full force and effect.

> RESOLVED, That the President, any Senior Vice-President, the Vice President – Finance, and the Treasurer are each hereby authorized, for and on behalf of Shell Oil Company ("Shell Oil"), to guarantee, up to Shell Oil's ownership interest, the financial and other obligations of any directly or indirectly held less than wholly-owned subsidiaries to the same extent that such executing officer would otherwise be authorized in the normal conduct of business to enter into the transaction in question directly on behalf of Shell Oil.

IT IS FURTHER CERTIFIED that R. J. Braud is the Vice President Finance and Controller and R. S. Menniti is the Treasurer of the Company.

IT IS FURTHER CERTIFIED that, effective June 1, 2005, the title of Vice President Finance and Chief Financial Officer of the Company was renamed and changed to Vice President Finance, and all previously authorized and delegated authorities and powers granted or assigned to the title of Vice President Finance and Chief Financial Officer of the Company apply and transferred to the new title Vice President Finance, without any effect to the delegated authorities and powers.

IN WITNESS WHEREOF, this Certificate is signed and sealed with the Company's corporate seal on January 30, 2006.

SHELL OIL COMPANY INCORPORATED 1922 DELAWARE

Hector A. Pineda

H. A. Pineda, Assistant Secretary

SHELL OIL COMPANY

CERTIFICATE

I, H. A. Pineda, Assistant Secretary of SHELL OIL COMPANY (the "Company"), a Delaware corporation, DO HEREBY CERTIFY that the following is a true and correct list of the officers of the Company as of the date hereof:

J. D. Hofmeister
President

R. J. Braud
Vice President Finance and Controller

R. S. Menniti
Treasurer

A. M. Nolte
Assistant Controller

T. T. Coles
Vice President and General Tax Counsel

C. A. Lamboley
Senior Vice President, General Counsel and Corporate Secretary

S. J. Paul
Assistant Secretary

H. A. Pineda
Assistant Secretary

S. J. White
Assistant Secretary

IN WITNESS WHEREOF, this Certificate is signed and sealed with the Company's corporate seal on January 30, 2006.

H. A. Pineda, Assistant Secretary

PRICEWATERHOUSECOOPERS

PricewaterhouseCoopers LLP
1201 Louisiana
Suite 2900
Houston TX 77002-5678
Telephone (713) 356 4000
Facsimile (713) 356 4717

INDEPENDENT ACCOUNTANT'S REPORT ON APPLYING AGREED-UPON PROCEDURES

March 28, 2006

Mr. Randy Braud
Vice President Finance and Controller
Shell Oil Company
P.O. Box 2463
Houston, Texas 77252-2463

Dear Mr. Braud:

We have audited, in accordance with auditing standards generally accepted in the United States, the consolidated balance sheet of Shell Oil Company (the Company) as of December 31, 2005, and the related consolidated statements of income and earnings reinvested and of cash flows for the year then ended (collectively, the consolidated financial statements), and have issued our report thereon dated March 24, 2006. The consolidated financial statements and our report are included in the Company's Financial Review for the year ended December 31, 2005.

We have performed the procedures enumerated below relating to your accompanying letter dated March 28, 2006 to the State of Louisiana Department of Environmental Quality, Office of Management and Finance, Financial Services Division – Solid Waste (the Letter), which were agreed to by the Company solely to assist the Company in evaluating the financial data that the Letter specifies as having been derived from the Company's consolidated financial statements or accounting records. This engagement to apply agreed-upon procedures was performed in accordance with standards established by the American Institute of Certified Public Accountants. The sufficiency of the procedures is solely the responsibility of the specified users of the report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

1. We obtained the Company's schedule, which calculates Tangible Net Worth, as defined, as of December 31, 2005. Tangible Net Worth has been defined as Total Shareholder's Equity less the dollar amount recorded for goodwill, intangibles and software. We compared the dollar amount of $9,866 million being Tangible Net Worth, as defined, as of December 31, 2005 to a) the Letter (item 7, page 5) and b) the corresponding amount included in a schedule prepared by the Company from its accounting records and found such amounts to be in agreement. We a) compared the amount on the schedule of Total Shareholder's Equity of $13,435 million to the corresponding amount in the Company's December 31, 2005 Financial Review and found such amounts to be in agreement; b) compared the amounts on the schedule of i) goodwill of $2,310 million, and ii) intangibles of $1,259 million to the corresponding amounts appearing in the accounting records and found such amounts to be in agreement; and c) determined that the schedule was mathematically correct.

2. We obtained the Company's schedule, which calculates Total Assets in the United States as of December 31, 2005. The schedule reduced total assets in the United States by the dollar amounts of goodwill, intangibles and software. We compared the dollar amount of $53,579 million being Total Assets in the United States as of December 31, 2005 to a) the Letter (item 8, page 5) and b) the corresponding amount included in a schedule prepared by the Company from its accounting records and c) compared the dollar amounts included in the schedule to the corresponding amounts in the accounting records and found such amounts to be in agreement and d) determined that the schedule was mathematically correct.

We were not engaged to, and did not, perform an audit, the objective of which would be the expression of an opinion on the specified elements, accounts, or items. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you. This report relates only to the items specified above and does not extend to any other items or financial statements of the Company taken as a whole.

This report is intended solely for the use of the specified users listed above and should not be used by those who have not agreed to the procedures and taken responsibility for the sufficiency of the procedures for their purposes. However, this report is a matter of public record and its distribution is not limited.

Yours very truly,

PricewaterhouseCoopers LLP

APPENDIX W

ENGINEERING STATEMENT

ENGINEERING STATEMENT

The units included in this application were certified as part of the original permit application submittal in 1994 with the exception of the new East Surge Pond. The certification of the East Surge Pond will be provided upon construction completion.

APPENDIX X

ARRANGEMENTS WITH LOCAL FIRE AND/OR HOSPITALS

Industrial Emergency Services LLC

INDUSTRIAL EMERGENCY SERVICES, L.L.C.

ROBERT C. ANDREWS, JR., PE, MSc, EFO, CFO
President
Fire Chief

GLORIA J. GIL, CPS
Executive Assistant
Office Manager

HEADQUARTERS
Charter Bank Building
801 N. Navigation Blvd., Suite 200
Corpus Christi, TX 78408-2644
Phone: 361.653.7100
FAX: 361.653.7120
Internet: www.iesllc.com

DANIEL GARCIA
Vice President
Deputy Fire Chief

L[illegible]ANA OPERATIONS
17451 Jefferson Highway, Suite C
Baton Rouge, LA 70817
Phone: 225.218.6458
FAX: 225.218.6462

BARRY BROWNING, MBE
Chief Fire Officer

UNITED KINGDOM, EUROPE
MIDDLE EAST, PACIFIC RIM
55 Ferndale Road
New Milton
Hampshire
BH 25 5EX
United Kingdom
Phone/FAX: +44.1425.615282

31 October 2006
DG2006-005

Mr. Donald Faucheux – Fire Chief
Motiva Enterprises, LLC
Highway 70 at 44
Convent, Louisiana 70723

Ref: EMERGENCY RESPONSE SERVICES
Motiva Enterprises, LLC - Convent, Louisiana

Dear Mr. Faucheux:

Industrial Emergency Services LLC (IES) is pleased to provide Motiva Enterprises, LLC Convent Refinery with emergency response services. The Convent Refinery is staffed 24/7 by an IES team consisting of one captain and four firefighters. A command officer is also assigned to the refinery Monday through Friday during normal working hours. All IES firefighters are trained in interior structural firefighting as defined by NFPA-600; Hazardous Materials Technicians as defined by NFPA-472; and rescue technicians. IES personnel are also trained in basic first aid, high angle rescue and in confined space rescue which meets the requirements of 29 CFR 1910.146.

IES personnel are trained and have access to Motiva's Emergency Response Plan (ERP). The ERP provides pre-planning and preparedness for managing emergency situations including fire or explosion, hazardous substance spills, flammable or toxic gas releases, hurricane planning and security-related emergencies such as bomb threats.

IES appreciates the opportunity of providing emergency response services to Motiva. If you have any questions or need any additional information, please do not hesitate to contact me at 225.218.6458.

Sincerely,

Daniel Garcia
Vice President & Deputy Fire Chief

pc: DG Correspondence File

REFINERY EMERGENCY RESPONSE TEAMS

Shift Fire Brigade

IES contracted firefighters are supported on a 24 hour basis by a Shift Fire Brigade who are MOTIVA ENTERPRISES employees. Six Shift Fire Brigade members are on duty on each of the refinery's four shifts which rotate every 12 hours. All Shift Fire Brigade members are qualified Refinery Operators and are trained to the advanced exterior firefighting level as defined by NFPA-600 and the hazardous materials operations level as defined by OSHA 1910.120.

Volunteer Fire Team

Both IES contracted firefighters and Shift Fire Brigade members are backed up by a Volunteer Fire Team which consists of approximately 25 to 35 MOTIVA ENTERPRISES employees who volunteer their time as a collateral duty. All members are trained to the advanced exterior and interior structural firefighting level as defined by NFPA-600. Volunteer Fire Team members carry pagers and are subject to off-duty recall.

Volunteer First Aid Search and Rescue Team

The refinery maintains a Volunteer Search and Rescue Team consisting of approximately 25 MOTIVA ENTERPRISES employees. Members are trained in basic first aid, high angle rescue, and in confined spaces rescue which meets the requirements of 29 CFR 1910.146.

Volunteer Release Team

The refinery maintains a Volunteer Release Team consisting of approximately 25 MOTIVA ENTERPRISES or other contractor employees. The Release Team responds to hazardous materials spills within the refinery and conducts air monitoring. Team members are trained to the Hazardous Materials Technician level and meet the requirements OSHA 1910.120 (q).

Incident Management Team

The refinery maintains an Incident Management System to support all emergency responses within the refinery. All personnel who may function as the Incident Commander meet the requirements of OSHA 1910.120 (q).

MEDICAL DISASTER PLANNING

Medical disaster planning is an important element of this emergency response plan. The purpose of the Convent Refinery's medical disaster plan is twofold:

1. The further reduction of injury or loss of lives; and
2. The implementation of a medical management practice.

In the event of a critical event or site disaster involving multiple victim injuries or fatalities, medical management will be instituted as follows:

- o Medical personnel will immediately report to the Medical Department for initial assessment and triage, utilizing the Bayou Room as the holding area for injuries. Should the incident occur during off-shift hours, the Occupational Health nurse, as well as other team participants, will be reached by pager.
- o Medical personnel will be comprised of MOTIVA's Occupational Health Nurse, IES Emergency Medical Technicians, and First Responders from MOTIVA's First Aid Search and Rescue Team. The Occupational Health Nurse will determine the number of medical personnel required to respond to the event.
- o Injured personnel will be transported to the Bayou Room where initial assessment and triage will take place.
- o The company physician will be notified of the event and requested to render on site assistance.
- * Acadian Ambulance Service will be immediately notified by the medical scribe (Medical secretary during on-shift or Human Resources information contact off-shift), advising of the incident, with an estimated number of injured. Additional medical assistance will be requested at this time, if needed.
- o The area hospital, Riverview Medical Center, will be alerted to the potential number of injured which will be transported to their facility.
- o In the event the Medical Department and Bayou Room is not accessible, an Alternate Medical Site has been designed. This site to be utilized will be Maintenance East Lunchroom. This site was chosen because of its location, size, and facilities conducive to medical triage and treatment.
- o The Human Resources Manager (or designee) will be responsible for notifying the families of injured employees.
- o In case of fatalities, the Human Resources Manager (or designee) will coordinate necessary information to proper sheriff's department personnel and Coroner's office.

TACTICAL EMERGENCY RESPONSE PROCEDURES

MOTIVA ENTERPRISES has developed a detailed set of Tactical Emergency Response Procedures for use by the refinery Emergency Response Teams and members of Industrial Emergency Services assigned to the refinery. The Tactical Procedures have been prepared as a desk-reference to:

1. Meet regulatory compliance requirements for emergency response Standard Operating Procedures.
2. Serve as a training aide for Emergency Response Team training.
3. Orient new emergency response personnel to refinery emergency response tactics.
4. Guide incident critiques.

The Tactical Procedures Manual consist of 24 individual 8 to 10 page procedures which have been written as stand-alone documents so that they may be removed from the Manual for easy reference.

ST. ELIZABETH HOSPITAL

Franciscan Missionaries of Our Lady Health System

October 31, 2006

Monica Lavigne, RN
Motiva Enterprises, LLC
Highway 70 at 44
Convent, LA. 70723

Ref: Emergency Medical Service
Motiva Enterprises, LLC
Convent, Louisiana

Dear Mrs. Lavigne:

St. Elizabeth Hospital located in Gonzales, Louisiana hereby acknowledges our facility as the medical center on record for receiving emergencies from the Motiva Enterprises, LLC refinery in Convent, Louisiana (Motiva). Should an accidental injury, fire, explosion, or other emergency arise at the Motiva refinery, St Elizabeth Hospital is willing and able to respond.

St. Elizabeth is a fully staffed acute care facility licensed for 95 beds. St Elizabeth provides a wide array of services such as emergency, surgery, intensive care, imaging, telemetry, and other inpatient and outpatient medical needs. If in the event a patient requires services that are not available at St. Elizabeth Hospital, the patient will be stabilized and transferred to another acute care facility based on their needs.

We look forward to working together in the care of your employees through the years.

Sincerely,

Dee LeJeune

Dee LeJeune, RN
President/CEO

St. Elizabeth Hospital has earned the Joint Commission's Gold Seal of Approval™

FACT SHEET

Cardiopulmonary Services		**Surgical Services**	
	Respiratory Therapy		Staffed or On-Call 24 hours per day, 7 days per week
	Arterial Blood Gases		Minimum of 2 staff members assigned to each case
	Pulmonary Rehabilitation		OR staff are cross trained to all OR areas
	Pulmonary Function Testing		Surgery Scheduler available at 647-MDMD
	Routine Stress Testing		3 Operating rooms, 2 Endo rooms
	Persantine Stress Testing		
	Cardiolyte Stress Testing		Portable x-ray, C-Arm available
	Holter Set Up		Laparoscopic and Arthroscopic Capability
	Holter Scanning		CO2 Laser Capability
	ECHO		ENT, Opthalmology & Plastics Microscopes
	EEG		
	Sleep Studies		
		Same Day Surgery	
Critical Care Services			10 same day surgery beds with separate waiting area
	7 Bed ICU		1 pediatric room available
	1 Isolation Room		
	Remote telemetry monitoring of all in-house patients	**Post Anesthesia Care Unit**	
			5 PACU beds Available
Emergency Services			
	Staffed by Emergency Medicine Physicians	**Senior Care (Gero-Psych)**	
	10 beds including special treatment rooms for cardiac,		Eligibility - 55 Years of Age or Older
	Trauma, Ortho, and GYN cases.		10 beds available
	All surgery and ancillary services adjacent to the ER		Board Certified Social Workers
	Helipad adjacent to the ER		Interdisciplinary team approach
	Nursing staff trained in ACLS		Recreational Therapist
			Weekly patient care conference meetings
Laboratory			
	Hematology and Coagulation	**Medical - Surgical Services**	
	Urinalysis		66 bed unit covering Medical, Surgical, Orthopedic,
	Chemistry		Urology, ENT, Vascular and Pediatric Patients
	Microbiology		12 Telemetry beds available
	Parasitology		Swing bed patient status available
	Immunohematology		
		Radiology	
Pharmacy			2 Fluoroscopic units
	Pharmacokinetic Dosing Available		Routine Room with Tomography Capability
	Formulary		Portable C-Arm
	Therapeutic Intervention Program		3 portable x-ray units
			GE NXI Highspeed CT Scanner
Ultrasound			2 Mammography Units
	Acuson Sequoia Ultrasound		Fixed MRI
Nuclear Medicine		**Other Services**	
	GE Starcam Nuclear Medicine Camera		Nutritional Counseling
			Physical Medicine Services (Inpatient Only)
			Occupational Therapy (Inpatient Only)
			Speech Therapy (Inpatient Only)

APPENDIX Y

GEOTECHNICAL INVESTIGATION

aquaterra engineering

GEOTECHNICAL INVESTIGATION

STORMWATER POND CONVERSION

MOTIVA ENTERPRISES CONVENT REFINERY

REPORT DATE:

MAY 23, 2005

PREPARED FOR:

MOTIVA ENTERPRISES, LLC

CONVENT, LOUISIANA

PREPARED BY:

AQUATERRA ENGINEERING, LLC
P. O. BOX 82160 • BATON ROUGE, LA 70884-2160
3499 I-10 FRONTAGE ROAD • PORT ALLEN, LOUISIANA
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STATE OF LOUISIANA
VICTOR R. DONALD
REG. No. 21058
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

VICTOR R. DONALD, P.E.

1.0 INTRODUCTION

An existing stormwater pond at the Motiva Convent Refinery will be converted to use as a wet weather flow process-Contact Water Pond (CWP). Such a facility is regulated by State of Louisiana *Environmental Regulatory Code - VII Solid Waste Regulations* (the Regulations), as promulgated by the Louisiana Department of Environmental Quality (LDEQ). Therefore, a modification of the existing solid waste permit will be required in order to include this new facility.

The site is within the existing refinery area. Figure 1 shows the location of the facility. More detailed information regarding proposed construction is provided in Paragraph 2.2.

1.1 Purpose

Aquaterra Engineering, LLC was retained by Motiva to conduct a hydrogeologic and geotechnical investigation to support the permitting effort that is necessary to add the impoundment to the existing solid waste permit for the area. This investigation was intended to determine subsurface conditions and to develop options available for modification of the existing impoundment to meet the design requirements of the Solid Waste Regulations as regulated by the LDEQ.

1.2 Scope

The hydrogeologic and geotechnical investigation conducted for this project included the following:

- Data Review: Pertinent information from the existing solid waste permit that encompasses the general area was reviewed to ascertain an understanding of data available to develop the permit application.
- Work Scope Development: A work scope was developed to collect the additional field and laboratory data that would be necessary to characterize the site for the permit application.
- Site Reconnaissance: A visual review and documentation of site conditions pertinent to the hydrogeologic and geotechnical study at the time of our field exploration was accomplished.
- Field Investigation: Four soil borings, ranging in depth from 40 to 100 feet, and sampled continuously to the 40 foot depth were completed, and two monitor wells were installed within the shallowest water bearing zone. The locations of the soil borings and monitor wells are illustrated on Figure 2.
- Laboratory Testing: Physical properties testing including moisture content, Atterberg limits, particle size, unconfined compressive strength, and permeability were conducted on selected soil samples.
- Engineering Evaluations & Reporting: The performance of hydrogeologic evaluations and geotechnical engineering analyses for pertinent design recommendations and the development of this report.

1.3 Procedures

This investigation followed procedures established by our firm as routine for an investigation of this nature with sampling and analyses in general accordance with appropriate guidelines established by ASTM. Appendix A describes the field and laboratory procedures utilized to accomplish this geotechnical investigation.

1.4 Limitations

The analyses and recommendations presented in this report are based upon the assumption that the soil borings made for this investigation represent the soil and groundwater conditions throughout the site. Variations in soil or groundwater conditions may occur between or away from the boring locations. If conditions different from those described in Section 3 are encountered or are expected, this office should be promptly notified so that effects the varying conditions can be determined, and any necessary changes to these analyses and recommendations can be made.

This investigation program and these recommendations are intended for specific application to the project generally described in Section 2 at the site described in Paragraph 3.1. The data or the analyses and recommendations presented in this report are not necessarily applicable for any other project or location. If the nature of the project should change from the descriptions provided in Section 2, these recommendations should be reevaluated.

The only warranty made in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty is expressed or implied.

2.0 PROJECT INFORMATION

The following paragraphs present the project information that was available at the time this report was prepared. Should this information be incorrect, or changes significantly, please contact this office so that our analysis and recommendations can be reevaluated.

2.1 Information Sources

Information related to this project was provided reviewing existing documents, including the existing permit application, as provided by Motiva, and by reviewing a document entitled "Storm Water Pond Survey" developed by CK Associates and dated July 1994 that provided a characterization of the stormwater pond.

2.2 Anticipated Construction

We understand that the existing impoundment will be converted to use as a wet weather flow process-Contact Water Pond (CWP). The CWP would include the entire area that is currently utilized as the stormwater pond. Construction will include the changes to pond that would be necessary to convert the pond to use as a CWP consistent with the design requirements for a solid waste impoundment.

3.0 SITE CONDITIONS

In a geotechnical investigation of this nature, local topography and surface conditions, geologic setting and site-specific soil and groundwater conditions are important. The following paragraphs summarize our findings relative to these topics.

3.1 Physical Setting

At the time of our exploration, the site exists as a stormwater retention pond. Motiva maintains a series of Waste Water Treatment ponds that are permitted solid waste impoundments. The stormwater pond is similar in construction to a series of wastewater treatments ponds within the facility that are permitted solid waste impoundements, but the pond does not contain any constructed liner. The impoundment is approximately 1000 feet long and 200 feet wide. The depth of the impoundment is approximately five feet below natural grade, and a perimeter levee system is constructed to a height of approximately four feet above grade. The area is generally covered with shell aggregate.

The flow of stormwater in the pond has caused a silt accumulation that is approximately 1.8 feet thick across the base of the impoundment. The recent evaluation of the sediments included analytical testing and comparison of the test results to LDEQ regulations for established risk evaluation protocols. This evaluation concluded that the sediment does not contain contaminants at concentrations in excess of the maximum values allowed.

3.2 Geologic Setting

Figure 3 provides a reproduction of published geologic literature that illustrates the surface geology of the area. As shown on that figure, the Convent refinery is located in an area that is predominated by the Prairie Terrace Complex of Pleistocene Age. This deposit is overconsolidated and is characterized as firm to very stiff tan and gray clays silty clays and clayey silts with sand layering. However, as the figure illustrates, the western, southern and eastern extents of the refinery are within Holocene Age deposits. These deposits are fluvial depositions of the Mississippi River in the case of the natural levee deposits to the south and the point bar/meander scroll deposits to the west. These Holocene Age deposits are normally consolidated and therefore weaker and more compressible than the Pleistocene deposits. Pleistocene Age soils are present beneath the Holocene soils at relatively shallow depths.

3.3 Soil Conditions

The soil borings encountered conditions that are typical for the geologic setting described above and the plant in general. Figure 1 shows the locations of geologic cross-sections taken through selected soil borings. The cross-sections are illustrated as Figures 4 and 5. The soil boring logs in Appendix A provide details of the conditions encountered at each boring location and provide the field and laboratory data collected.

The conditions within the upper 40 feet can be subdivided into three basic strata. Each stratum is addressed below.

3.3.1 Upper Clay

The borings typically encountered a topstratum consisting of stiff tan and gray clay (Unified Soil Classification System symbol, CH). The material was characterized as firm to soft at Boring SP-1, and the upper four feet was classified as lean (silty) clay (CL) at Boring SP-4. The formation was present to a depth of about 10 to 12 feet.

This formation would be expected to be essentially impermeable. Two permeability tests were performed on a sample from the upper clay. The results indicated a hydraulic conductivity of 6.1E-09 cm/sec and 9.7E-09 cm/sec. Such conditions are among the lowest hydraulic conductivity values that would be expected for soil formations. As a result, this deposit, which encompasses the sides and the base of the stormwater pond can be considered to be essentially impermeable.

3.3.2 Waterbearing Silty Clay

The upper clay was underlain by a silty clay (CL) that allowed the seepage of groundwater into the borehole. This formation is generally described within the plant site as the shallowest water bearing zone. Shear strength testing indicated that the undrained shear strength of the formation was typically firm, but was noted as soft to firm in Boring SP-3. The stratum typically extended to a depth of 20 to 22 feet.

The results of three permeability tests conducted on soil samples collected from this stratum indicate hydraulic conductivity values ranging from 2.2 E-07 cm/sec to 1.8E-08 cm/sec. These values are also considered relatively low. It is likely that horizontally stratified silt layering that is likely within this formation would increase the permeability of the formation to values in excess of the laboratory determined values (that induce vertical flow through the formation). This opinion is based upon the observations of free water observed within the open borehole during the sampling effort.

3.3.3 Plastic Clay

The base of the waterbearing silty clay is consistently formed by a stratum of highly plastic tan and light gray clays (CH). The shear strength testing performed on samples from the clay classify the formation as stiff. These clays commonly exhibit plasticity indices of in excess of 50, indicative of very plastic conditions. These conditions were present in all of the borings that terminated at 40 feet, and were present to 56 feet in the deeper boring.

These plastic clays can be considered to be at least as impermeable as the upper clay formation described in Section 3.3.1. Although no permeability testing was performed on these soils. Experience with these soil types indicate hydraulic conductivity values of less than 10E-08.

3.3.4 Deeper Conditions

Soil Boring SP-2 was extended to a depth of 100 feet to allow a general characterization of conditions below 40 feet. As noted in Section 3.3.3, the plastic clay statum was present to 56 feet in that boring. Stiff silty clay (CL) was present from 56 to 82 feet. From 82 feet and to the base of the 100 foot deep boring, alternating layers of sandy silty (ML) and silty clay (CL) were noted.

3.4 Groundwater Conditions

As described in Appendix A, the soil borings were dry augered to document groundwater conditions at the time of our investigation. Groundwater was typically encountered within the waterbearing silty clay stratum. The inset table lists the observations regarding water level that were recorded during the recent exploration program. These observations are also recorded on the soil boring logs and on the soil profile illustrated on Figure 3. The detection of groundwater within the silty clay indicates that the formation is capable of transmitting ground water. However, the formation is probably very slowly permeable, and would transmit water at very low rates of flow.

Groundwater Observatons During Drilling		
Boring No.	Originally Encountered	Water Level after 10-15 min.
SP-1	14.0 ft	11.0 ft
SP-2	18.0 ft	14.0 ft
SP-3	12.0 ft	10.0 ft
SP-4	14.0 ft	13.8 ft

The underlying, high plasticity clay formation will restrict vertical groundwater migration. These clays are considered to be essentially impermeable. Therefore, groundwater migration within the waterbearing silty clay is restricted to horizontal flow.

Potentiometric elevations as derived from the existing permit application data indicate that the flow of groundwater in the vicinity of he stormawater pond is generally south, and the gradient for flow is approximately 0.0038 ft/ft. Utilizing this potentiometric data and the maximum value determined for hydraulic conductivity and estimates for effective porosity based upon average grain size conditions within the upper granular media, Darcy's law has been applied to estimate the rate of groundwater flow.

$q = k \times i / n_e$ where

q = groundwater flow rate (ft/yr) calculated as 0.004 ft/yr

k = hydraulic conductivity (2.2E-07 cm/sec or 0.23 ft/yr)

i = hydraulic gradient (ft/ft) (measured as 0.00038)

n_e = effective porosity (dimensionless, estimated to be 0.2)

4.0 HYDROGEOLOGIC, GEOTECHNICAL and REGULATORY OVERVIEW

The information collected as a part of this investigation provides adequate data for characterization of the site as necessary for the requirements of the regulations. Also, from an engineering perspective, adequate data are available to develop a final design of the facility. The following paragraphs address these issues.

4.1 Hydrogeologic Overview

The location of the site within the upper clay stratum as defined in Section 3.3.1 creates a favorable condition from a hydrogeologic perspective. The clays form an effective, natural barrier to the migration of groundwater away from the impoundment. However, the presence of the clays in a naturally occurring deposit presents the potential for macroscopic discontinuities that are common in such formations. Examples of discontinuities which commonly occur in formations of this type include fissures, slickensides, joints, ferrous and calcareous deposits as well as thin silt seams and layers. These features could allow leakage of fluids from an impoundment that creates a hydrostatic head across the entire formation. Therefore, recompaction of the clay formation is necessary to develop an engineered layer that exhibits a consistent formation of low hydraulic conductivity.

The water bearing silty clay formation is present beneath the impoundment. However approximately five feet of the upper clays are apparently present above the silty clay. Excavations to depths in excess of 8 feet would potentially encounter the silty clay deposits, and this formation is capable of providing groundwater flow to the excavation. This formation would serve as a good stratum for groundwater monitoring, capable of detecting leakage from the impoundment as a result of its consistent presence beneath the impoundment and to monitor wells present in the formation.

4.2 Geotechnical Overview

The sediments that are present in the impoundment are relatively unstable as a result of their high moisture content and high void ratio. These sediments should be removed in order to provide a stable subgrade for the liner construction that is necessary to meet regulatory requirements for this site. If the sediments can be placed in a manner that they can drain for a period of months, the materials will probably be sufficient for use as fill material in other areas of the site.

Excavations of the sediments to the underlying stiff clays may encounter groundwater that emanates from the sediments. However, little groundwater is expected from the natural soils for excavations that are less than 10 feet.

The underlying stiff clays are competent materials and capable of support of the impoundment and maintaining stable slopes of 3 (horizontal) to 1 (vertical) or flatter. These materials should also serve as a source of material for use in the construction of a recompacted clay liner.

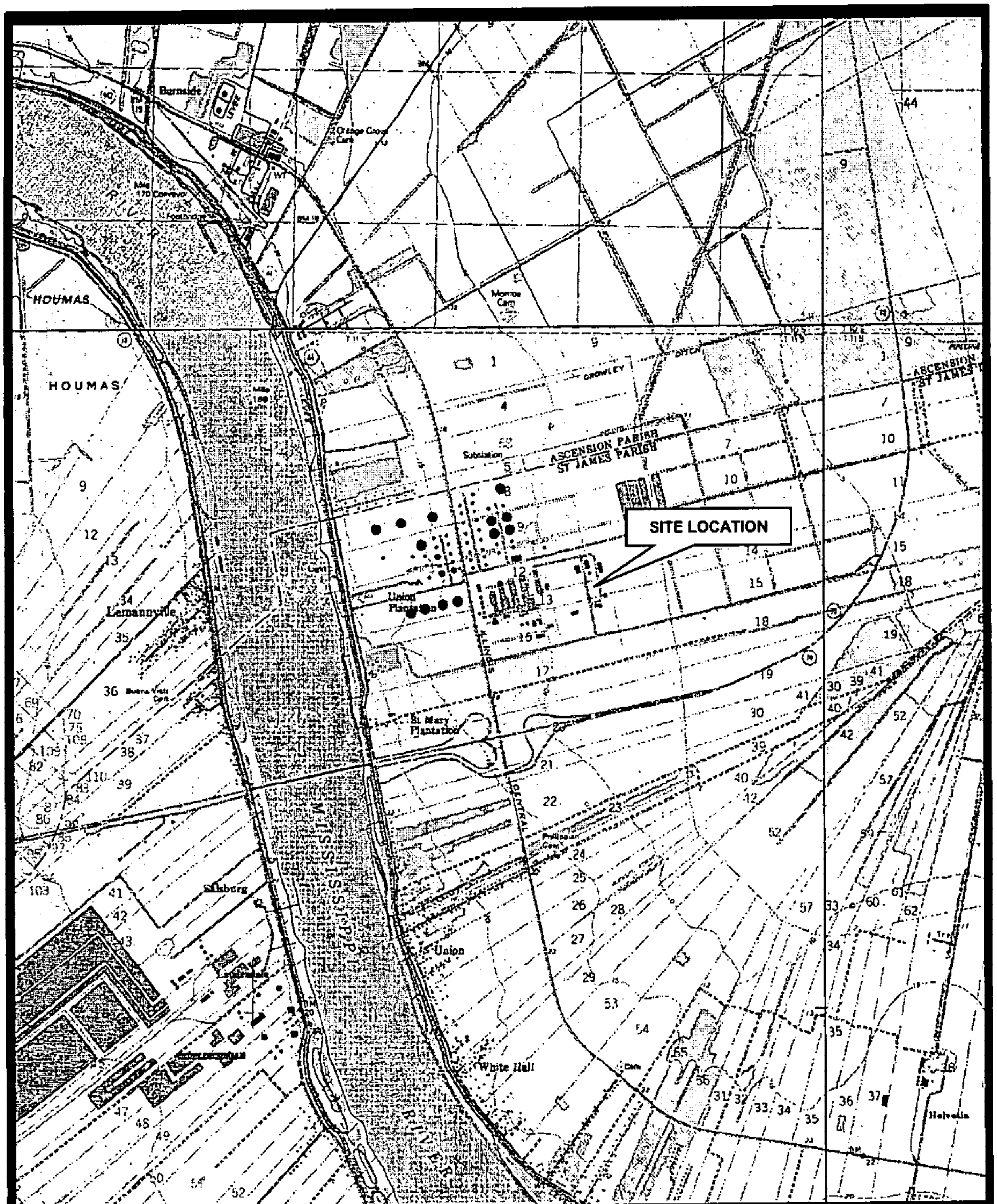
4.3 Regulatory Overview

As a solid waste surface impoundment, the facility would be regulated by LAC Title 33 Part VII, Subpart 1 - Solid Waste Regulations. The site investigation conducted for this project was performed to amend the permit application with the information that is considered necessary by regulation. Appendix B includes excerpts from the Regulations that are applicable to site-specific hydrogeologic and geotechnical considerations. Each pertinent excerpt includes a response for this facility.

In order to address the regulatory requirements, a three foot thick, recompacted clay liner and a 60 mil HDPE flexible membrane liner will be required. The recompacted clay liner can be constructed from the existing clays that comprise the base and sides of the landfill subsequent to removal of the sediments present.

The regulations require a construction quality assurance and quality control plan that addresses the various components of construction for the impoundment. Appendix C has been developed to provide that plan consistent with the requirements of the regulations. The plan includes specification criteria that will be required to meet the regulatory requirements as wells as test methods and frequencies necessary to document compliance with the regulations.

FIGURES

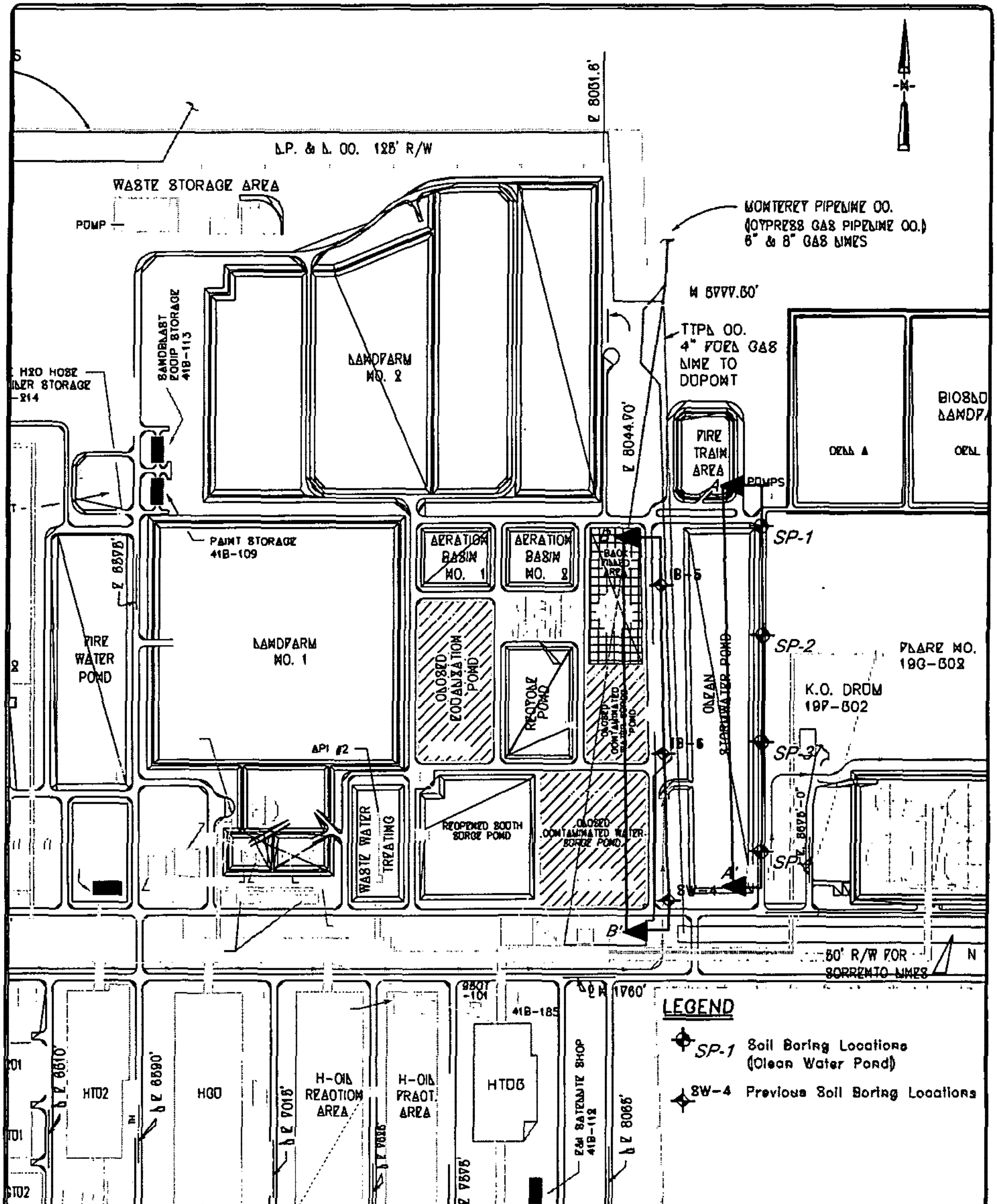


SOURCE: USGS 7.5' TOPOGRAPHIC MAP
DONALDSONVILLE, LA QUADRANGLES
ORIGINATION DATE: 1994

TOPOGRAPHIC MAP

Geotechnical Investigation
Clean Water Pond Conversion
Convent, Louisiana
Motiva Enterprises, LLC

Engr: VRD 915073	aquaterra engineering	Fig No. 1



MOTIVA
ENTERPRISES LLC
SHELL, TEXACO & SAUDI ARAMCO WORKING TOGETHER

0 25 50
SCALE IN FEET

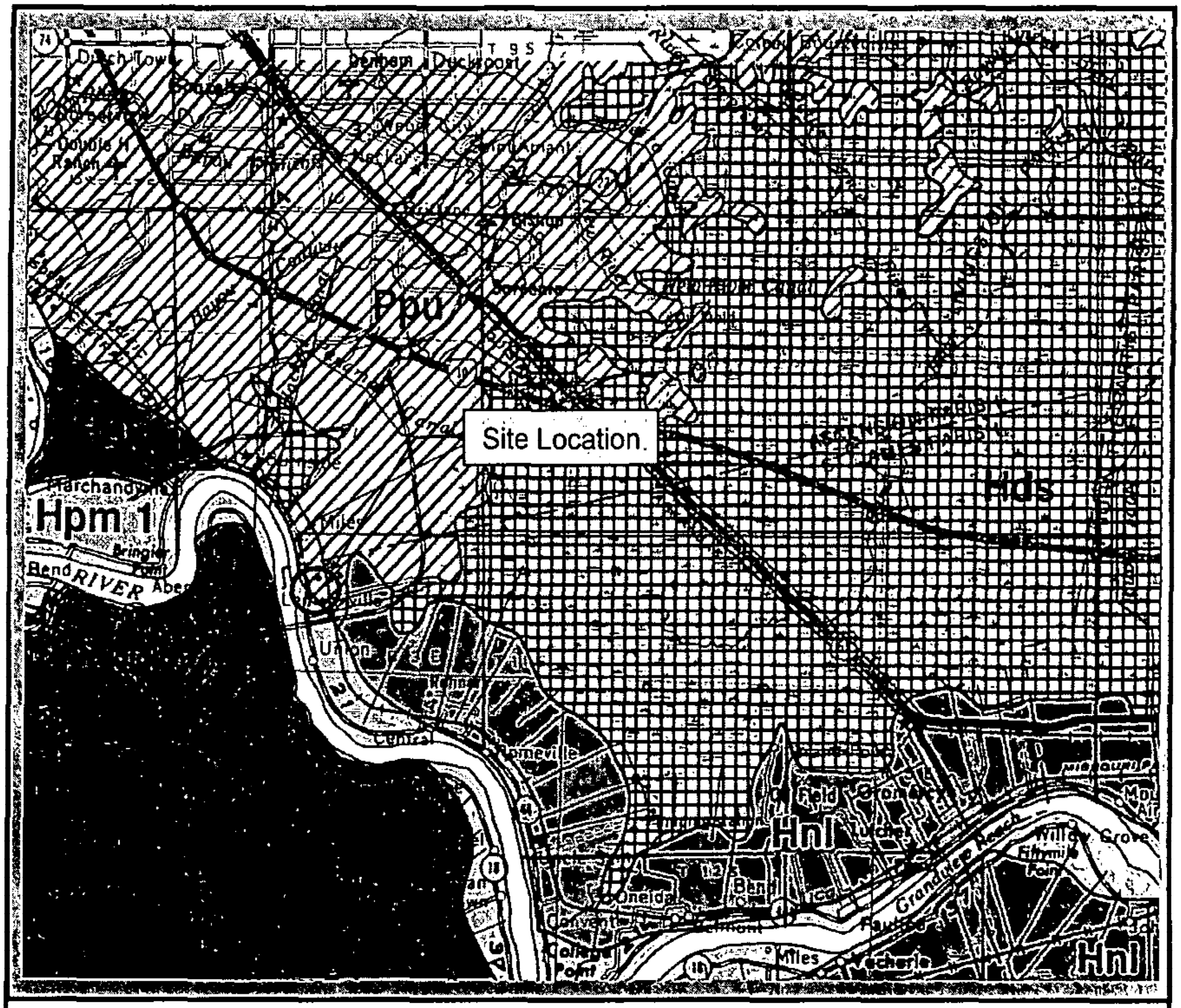
aquaterra
engineering

APPROVED: BY: V. DONALD, P.E.
DATE: 17 MAY 06

DRAFTED BY:	RCA	DATE:	10 MAR 06
CHECKED BY:	DML	DATE:	10 MAR 06
LAST REVISION BY:	RCA	DATE:	10 MAR 06
LAST SAVED BY:	EMK	DATE:	25 May 06
PROJECT NO.:	9150PS	FILE:	site layout.dwg

SOIL BORING LOCATIONS
CLEAN WATER POND CONVERSION
MOTIVA ENTERPRISES LLC
CONVENT, LOUISIANA

FIGURE
2



Holocene Age Deposits

Hnl

Natural levees in the deltaic plains associated with the Mississippi River

Hds

Inland swamp deposits. Represents freshwater swamp environment.

Hpm 1-6

Point bar (meander scroll) deposits of the Mississippi River meander belts 1-6.

Backswamp (floodplain) deposits.

Pleistocene Age Deposits

Ppu 1,2

Undifferentiated fluvial deposits of the Prairie Complex. Mostly natural levee and backswamp deposits of the Mississippi, Arkansas and Red Rivers. Two levels recognized.

Ref: Geomorphology and Quaternary Geologic History of the Lower Mississippi Valley, Dec. 1994, Vol. II

North

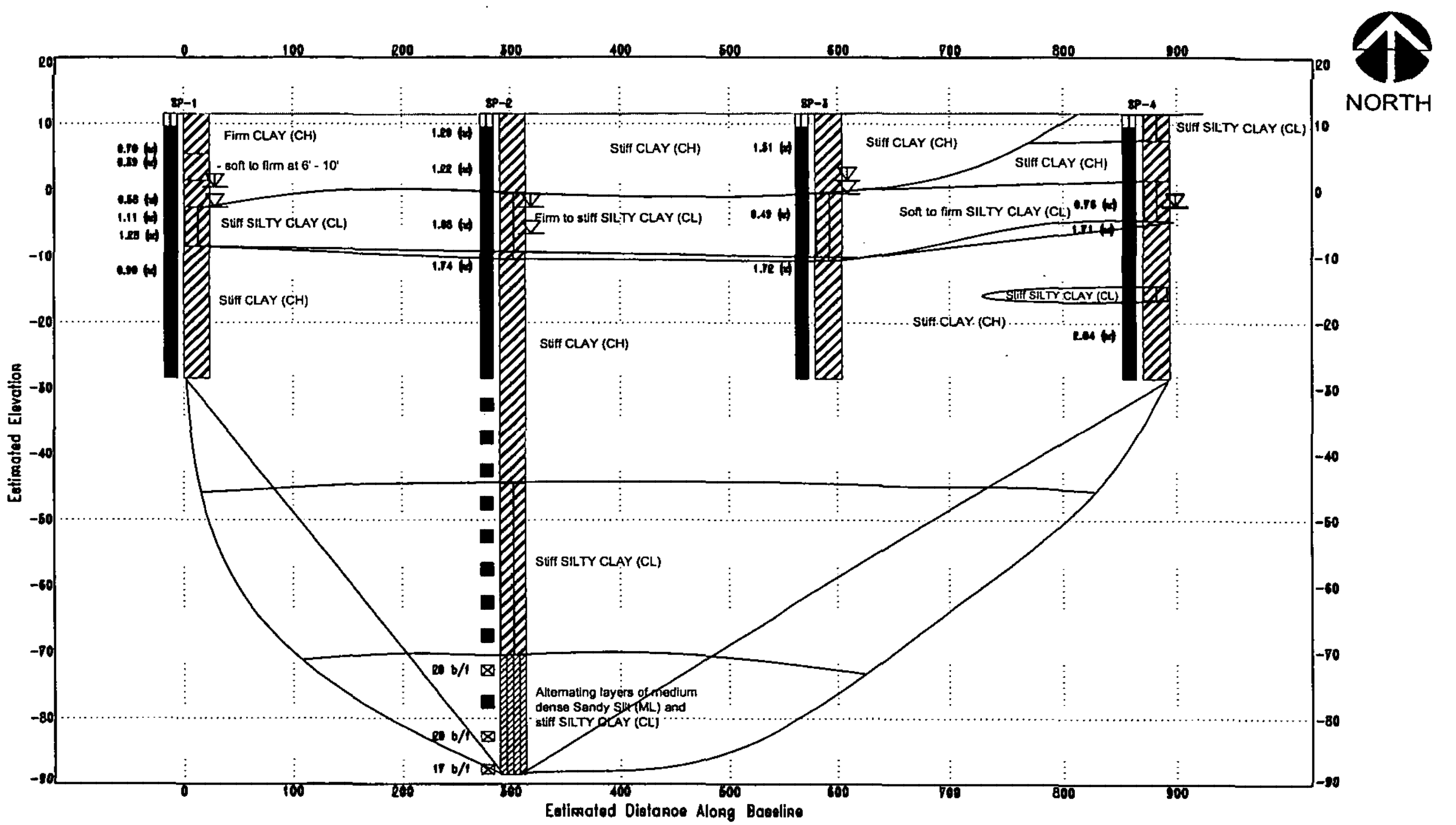
aquaterra engineering
Environmental and Geotechnical Consultants

APPROVED:
BY: VRD
DATE: 05/23/05

DRAFTED BY: wlw	DATE: 05/23/05
CHECKED BY: vrd	DATE: 05/23/05
LAST REVISION BY: wlw	DATE: 05/23/05
PROJECT NO: 915073	FILE NO: 915073

Geologic Setting
Stormwater Pond Conversion
Motiva Convent Refinery

FIGURE
3



NOTES:
Descriptions are general and do not completely define conditions at each boring. See Appendix A for more detailed information.

Stratigraphy is interpolated between soil boring locations. Actual conditions may vary.

-- LEGEND --

- Existing Ground Surface
- (u) Undrained shear strength test determined by means of unconfined compression
- ▽ Groundwater Initially Encountered
- ▽ Groundwater Level after specified time

ENGINEER:	VRD
DRAWN:	WLW
CHECKED:	VRD
DATE:	5/13/05
PROJECT:	915073

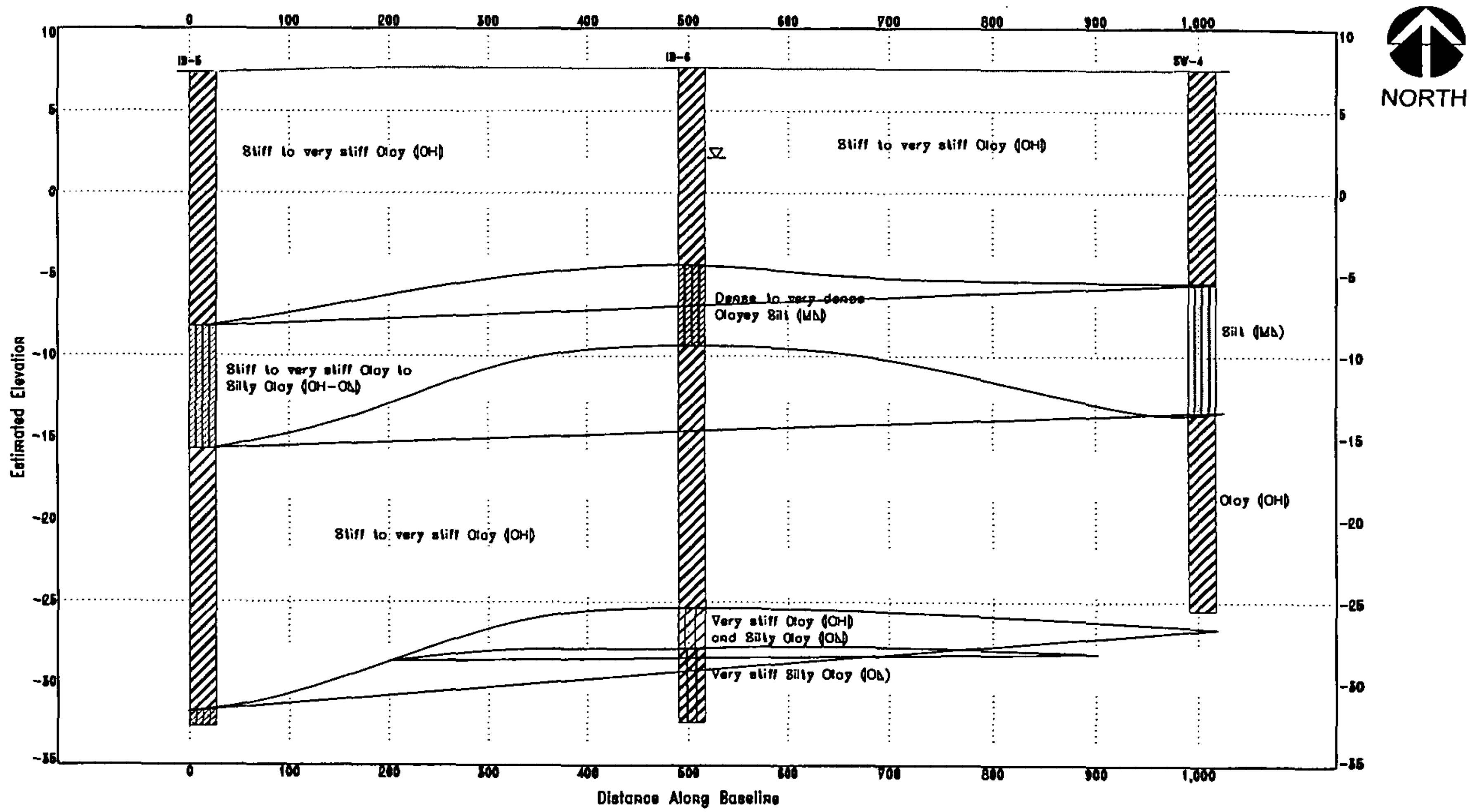
aquaterra engineering

SOIL PROFILE A - A'

Motiva Clean Water Pond Conversion
Convent, Louisiana

Motiva Convent Refinery
Convent, Louisiana

FIGURE NO. 4



NOTES:
Descriptions are general and do not completely define conditions at each boring. See Appendix A for more detailed information.

Stratigraphy is interpolated between soil boring locations. Actual conditions may vary.

-- LEGEND --

——	Existing Ground Surface
▽	Groundwater Initially Encountered
▽	Groundwater Level after specified time

ENGINEER:	VRD
DRAWN:	WLW
CHECKED:	VRD
DATE:	5/13/05
PROJECT:	915073

aquaterra engineering

SOIL PROFILE B - B'

Motiva Clean Water Pond Conversion
Convent, Louisiana

Motiva Convent Refinery
Convent, Louisiana

FIGURE NO.
5

APPENDIX A

DESCRIPTION OF FIELD AND LABORATORY PROCEDURES
SOIL BORING LOGS
MONITOR WELL LOGS
SOIL BORING LEGEND
GRAIN SIZE CURVES

This geotechnical investigation was conducted utilizing standard procedures developed by Aquaterra Engineering, LLC for investigations of this nature. The following paragraphs describe the field and laboratory procedures utilized. Soil boring logs which provide data collected and a description of soil and groundwater conditions are also included. The appendix also provides a legend that describes the terms and symbols used in the boring logs.

FIELD INVESTIGATION

The field work was conducted on April 11 through 14, 2005. It included a site reconnaissance to document site characteristics pertinent to the geotechnical study and the conduct of a soil exploration program. An Aquaterra engineering technician documented the information collected during the field investigation.

Site Reconnaissance

The engineering technician walked the project site and documented observations that are significant to the geotechnical investigation. Such observations include topography, vegetation, trees, drainage, other structures, surface soil conditions, and trafficability.

Soil Borings

Four soil borings were advanced using a Simco 2800, *truck-mounted soil boring rig* at the general locations shown on Figure 2. The following paragraphs describe the advancement and sampling procedures.

Soil Boring Advancement. The soil borings were initially advanced by rotating a four-inch diameter, short-flight earth auger with the drilling rig, removing the auger from the boring, and cleaning the cuttings from the auger before sampling or reinserting the auger into the boring. This technique allowed for the observation of soil cuttings and description of soil conditions encountered. This dry auger technique also allowed detection of free groundwater within the boring.

The borings were advanced below the water table using rotary wash boring techniques by using a four-inch diameter drill bit, and circulating cuttings to the ground surface using drilling fluids injected through the drill stem. The drilling fluids stabilized the bore hole during sampling procedures.

Soil Sampling. The soil sampling program included the collection of both disturbed and undisturbed soil samples. Initially, disturbed samples were collected from the auger cuttings. The depth interval for the disturbed sample is indicated by a vertical line in the "Samples" column of the attached boring logs. Relatively undisturbed samples were obtained by pushing a three-inch diameter, Shelby tube sampler a distance of two feet into the soil in general accordance with ASTM D1587. Depths at which these undisturbed samples were obtained are indicated by a shaded portion in the "Samples" column of the attached boring logs.

After the Shelby tube was removed from the boring, the sample was extruded in the field and visually classified. Relative strength estimates of the sample were obtained by penetrometer readings. These penetrometer readings in units of tons per square foot are indicated by the symbol "(P)" in the "Field Test Results" column of the boring logs. Disturbed portions of the sample were discarded and the undisturbed sample was placed in a protective container for transportation to the laboratory.

In more granular conditions, the standard penetration test (SPT) was performed. In this case, representative disturbed samples were obtained in cohesionless soils by driving a two-inch OD split-spoon sampler a distance of 18 inches into the soil with blows from a 140-lb hammer falling a distance of 30 inches (ASTM D 1586). Depths at which split-spoon samples were taken are indicated by two crossed slashes in the "Samples" column of the boring logs. The number of blows required to drive the sampler for each six-inch increment was recorded. The penetration resistance is the number of blows required to drive the split-spoon sampler the final 12 inches of penetration. Information related to the penetration resistance is presented in the "Field Test Results" column of the boring logs as the number of blows per foot (b/f). The SPT samples were placed in sealed containers to minimize moisture loss during transport to the laboratory.

Groundwater Observations. During the soil boring advancement and sampling operation, observations for free groundwater were made. Information regarding water level observations is recorded in the "groundwater" column on the soil boring logs. Where free water was encountered, the depth of this observation is noted in that column as an open triangle. After encountering free water, boring operations were suspended for several minutes to allow the water level to rise and stabilize in the bore holes. The water level was again recorded and is illustrated on the attached boring logs as a triangle containing a vertical line.

Boring Abandonment. Immediately upon completion of each soil boring, the boring was sealed with a cement/bentonite grout by pumping the grout mixture to the bottom of the borehole and continuing to pump until grout returns were observed at the ground surface.

LABORATORY TESTING

The soil samples were delivered to the Aquaterra laboratory for testing. The project engineer reviewed the soil boring logs developed in the field and assigned laboratory testing on select samples to provide the data necessary for the anticipated designs.

Laboratory testing was accomplished to determine index and strength properties of the soils encountered. These procedures are discussed below.

Index Properties

Moisture Content. Moisture content tests were performed to better understand the classification and shrink/swell potential of the soils encountered. These tests were performed in general accordance with ASTM D 2216. The results of these tests are tabulated within the Laboratory Data section of the attached boring logs.

Atterberg Limits. Liquid limit (LL) and plastic limit (PL) determinations were performed to assist in classification by the Unified Soil Classification System (USCS). These tests were performed in general accordance with ASTM D 4318. The plasticity index (PI) was calculated as LL - PL for each Atterberg limit determination. The results of these tests are tabulated within the Laboratory Data section of the attached boring logs.

Grain Size Determinations. Selected granular soil samples were tested to determine the particle gradation to aid in classification and to further understand the engineering characteristics. These tests were performed in general accordance with ASTM D 422. The boring logs indicate the percent of the soil particles passing the No. 200 sieve (percent fines) in the "Percent Fines" column. Representative grain size analyses are illustrated as grain size curves in this Appendix.

Strength Tests

Unconfined Compression. The undrained shear strength of selected undisturbed soil samples was determined by means of unconfined compression tests (ASTM D 2166). In an unconfined compression test, a cylindrical sample of soil is subjected to a uniformly increasing axial strain until failure develops. For purely cohesive soils, the undrained shear strength, or cohesion, is taken to be equal to one-half of the maximum observed normal stress on the sample during the test.

The results of the unconfined and the triaxial compression tests are provided as undrained shear strength values within the Laboratory Data section of the attached boring logs. Also shown are the natural water contents and unit dry weights determined as a part of each compression test.

Flexible Wall Permeability Testing

This test method covers laboratory measurement of the hydraulic conductivity (coefficient of permeability) of water-saturated porous materials with a flexible wall permeameter at temperatures between about 59 and 86° F. This testing is performed in accordance with ASTM-D 5084-00.

PROJECT: Stormwater Pond Conversion
Motiva Convent Refinery
Convent, Louisiana

CLIENT: Motiva Enterprises, LLC
Convent, Louisiana

SOIL BORING LOG

No. SP-1

SHEET 1 OF 1

FILE: 915073
DATE: April 14, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 58.9"N
LONG: 90° 53' 11.6"W
Surface Elevation: 11.5 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight Moist (pcf)	Unit Weight Dry (pcf)	Percent Fines	Plastic Limit	Moisture Content	Liquid Limit	Plasticity Index (PI)
	1.00 (P)								
5	1.50 (P)	0.70	117	94		15	24	52	37
	0.25 (P)	0.39	102	74		19	38	83	64
	1.00 (P)					21	45	110	89
10	1.25 (P)								
	1.00 (P)	0.58	109	78		20	40	62	42
15	1.50 (P)	1.11	117	92		15	27	51	36
	1.25 (P)	1.28	118	93		18	27	49	31
	1.75 (P)								
20	2.25 (P)								
	2.50 (P)	0.90	114	86		19	32	87	68
25	2.50 (P)					33	40	85	52
	2.25 (P)								
	3.00 (P)								
30	3.25 (P)								
	3.00 (P)					16	25	72	56
35	3.25 (P)					20	33	82	62
	3.00 (P)								
	3.50 (P)					19	27	74	55
40									

Strata Break Depth	Description
6.0	Firm gray **CLAY (CH)** - with shell fragments
10.0	Soft to firm gray **CLAY (CH)** - with burnt wood and trace shell fragments - with ferrous streaks at 8'
14.0	Firm light gray and tan **CLAY (CH)** - with ferrous nodules and streaks
20.0	Stiff tan and light gray slightly **SILTY CLAY (CL-CH)** - with ferrous nodules
40.0	Stiff tan and light gray **CLAY (CH)** - with ferrous and calcarious nodules - very stiff below 22'

Hole Terminated at 40 feet.

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 14 ft.

Fell in at 11 ft. after 15 min.

Advancement Method

Short-flight Auger: 0' - 16'
Rotary Wash: 16' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

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PROJECT: Stormwater Pond Conversion
Motiva Convent Refinery
Convent, Louisiana

CLIENT: Motiva Enterprises, LLC
Convent, Louisiana

SOIL BORING LOG
No. SP-2
SHEET 1 OF 2

FILE: 915073
DATE: April 12, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 54.7"N
LONG: 90° 53' 11.4"W
Surface Elevation: 11.5 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Plastic Limit	Moisture Content	Liquid Limit	PI	Strata Break Depth	Description
											Stiff gray **CLAY (CH)** - with shell fragments to 4'
	2.50 (P)	1.20	120	97		15	24	58	43		
5	2.00 (P)										
	1.50 (P)	1.22	112	81		26	39	102	76		
	1.00 (P)										
10	1.00 (P)									12.0	
	1.25 (P)										Firm to stiff gray and tan **SILTY CLAY (CL)**
15	1.00 (P)										
	1.75 (P)	1.08	122	97	99 (g) (k)	18	26	39	21		
	0.75 (P)										
20	2.00 (P)									22.0	
	2.75 (P)	1.74	120	97		14	24	71	57		Stiff tan and light gray **CLAY (CH)** - with calcarcous nodules
25	2.50 (P)										
	2.25 (P)										
	3.00 (P)										
30	3.25 (P)					14	23	69	55		
	3.25 (P)										
35	2.75 (P)										
	3.25 (P)										
	3.25 (P)					16	24	63	47		
40											
	3.00 (P)										- slightly silty at 43' - 45'
45											
	2.75 (P)										
50											

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 18 ft.

▽ Rose to 14 ft. after 10 min,

Advancement Method

Short-flight Auger: 0' - 20'
Rotary Wash: 20' - 100'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

g: See attached grain size curves.
k: Permeability cm/sec:
16'- 18' = 2.19E-07

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PROJECT: Stormwater Pond Conversion
Motiva Convent Refinery
Convent, Louisiana

CLIENT: Motiva Enterprises, LLC
Convent, Louisiana

SOIL BORING LOG
No. SP-2
SHEET 2 OF 2

FILE: 915073
DATE: April 12, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 54.7"N
LONG: 90° 53' 11.4"W
Surface Elevation: 11.5 ±

Depth (feet)	Field Test Results	Percent Fines	Natural Moisture Content (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index (PI)	Strata Break Depth	DESCRIPTION
55	2.75 (P)				56.0	Stiff tan and light gray **CLAY (CH)** - with calcarcous nodules *(continued)*
60	3.75 (P)		17 / 23 / 39	22		Stiff tan and light gray **SILTY CLAY (CL)** - with fine sand
65	2.00 (P)	66	28			- with sandy silt layers at 63' - 65'
70	1.75 (P)					- dark gray at 68' - 70'
75	2.50 (P)		16 / 29 / 41	25		- with traces or organic matter at 73' - 75'
80	1.00 (P)	89	29		82.0	
85	20 b/f 8-7-13		16 / 28 / 33	17		Alternating layers of medium dense gray **SANDY SILT (ML)** and stiff **SILTY CLAY (CL)**
90	1.50 (P)	66	26			
95	20 b/f 7-9-11					
100	17 b/f 8-8-9	90	32		100.0	**Hole Terminated at 100 feet.**

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data
- First encountered at 18 ft.
- Rose to 14 ft. after 10 min.

Advancement Method
Short-flight Auger: 0' - 20'
Rotary Wash: 20' - 100'

Abandonment Method
Hole backfilled with cement/bentonite grout upon completion.

Notes

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PROJECT: Stormwater Pond Conversion
Motiva Convent Refinery
Convent, Louisiana

CLIENT: Motiva Enterprises, LLC
Convent, Louisiana

SOIL BORING LOG

No. SP-3

SHEET 1 OF 1

FILE: 915073
DATE: April 11, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 51.5"N
LONG: 90° 53' 10.4"W
Surface Elevation: 11.5 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Plastic Limit / Moisture Content / Liquid Limit	PI	Description	Strata Break Depth
								Stiff gray and tan **CLAY (CH)** - with shell fragments to 4'	
	2.75 (P)								
5	1.75 (P)	1.51	112	84	100 (g)	18 / 34 / 82	64		
	1.25 (P)								
	1.50 (P)				(k)	21 / 41 / 86	65		
10	1.50 (P)								12.0
	1.00 (P)							Soft to firm gray and tan **SILTY CLAY (CL)**	
15	0.50 (P)	0.49	114	87	100 (g) (k)	17 / 31 / 43	26		
	2.00 (P)								
20	2.00 (P)								
	2.75 (P)								22.0
	2.50 (P)	1.72	118	91		17 / 29 / 74	57	Stiff tan and light gray **CLAY (CH)**	
25	2.00 (P)								
	2.75 (P)								
	2.25 (P)								
30	3.00 (P)								
	3.00 (P)					17 / 26 / 59	42		
35	2.75 (P)								
	2.50 (P)								
	2.50 (P)					27 / 41 / 78	51		
40								**Hole Terminated at 40 feet.**	40.0
45									
50									

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data
▽ First encountered at 12 ft.
▽ Rose to 10 ft. after 10 min,

Advancement Method
Short-flight Auger: 0' - 14'
Rotary Wash: 14' - 40'

Abandonment Method
Hole backfilled with cement/bentonite grout upon completion.

Notes
g: See attached grain size curves.
k: Permeability cm/sec:
8'- 10' = 6.18E-09
14'-16' = 4.21E-08

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Convent, Louisiana

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Convent, Louisiana

SOIL BORING LOG

No. SP-4

SHEET 1 OF 1

FILE: 915073
DATE: April 12, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 48.1"N
LONG: 90° 53' 09.5"W
Surface Elevation: 11.5 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Plastic Limit	Moisture Content	Liquid Limit	PI	Strata Break Depth	Description
2	2.00 (P)					11		42	31	4.0	Stiff gray and brown **SILTY CLAY (CL)** - with shell fragments
4	1.50 (P)										Stiff gray **CLAY (CH)** - with shell fragments
6	1.25 (P)				(k)	22	36	92	70		
8	1.25 (P)									10.0	
10	1.75 (P)										Firm tan and gray **SILTY CLAY (CL)**
12	0.75 (P)	0.76	120	94	100 (g) (k)	19	27	42	23		
14	0.50 (P)									16.0	
16	1.25 (P)	1.71	120	97		13	24	55	42		Stiff to very stiff tan and light gray **CLAY (CH)**
18	2.00 (P)										
20	1.75 (P)										
22	2.25 (P)										
24	3.25 (P)									26.0	
26	2.00 (P)					16	28	34	18	28.0	Stiff tan and red **SILTY CLAY (CL)** - with sand
28	3.50 (P)										Stiff to very stiff tan and light gray **CLAY (CH)**
30	3.50 (P)										
32	2.50 (P)	2.04	128	102		15	26	72	57		
34	2.50 (P)										
36	3.25 (P)										
38	3.00 (P)					21	33	97	76	40.0	

Hole Terminated at 40 feet.

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data
First encountered at 14 ft.
Rose to 10 ft. after 13.8 min,

Advancement Method
Short-flight Auger: 0' - 14'
Rotary Wash: 14' - 40'

Abandonment Method
Hole backfilled with cement/bentonite grout upon completion.

Notes
g: See attached grain size curves.
k: Permeability cm/sec:
6'- 8' = 9.67E-09
12'- 14' = 1.79E-08

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PROJECT: Stormwater Pond Conversion
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CLIENT: Motiva Enterprises, LLC
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WELL INSTALLATION LOG

No. MW-21

SHEET 1 OF 1

FILE: 915073
DATE: April 14, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 48.7"N
LONG: 90° 53' 08.9"W

Depth (feet)	Samples	Groundwater Level	Field Test Results	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	OVA Reading	Moisture Content MC	Liquid Limit LL	Plasticity Index PI	Installation Details	Description	Strata Break Depth
0										6-inch protective steel shroud; *Top of riser cap at 3' above grade*; Concrete pad: 5' x 5' x 4" thick with 4 steel guard posts (-0.3)	Firm to stiff gray and brown **SILTY CLAY (CL)/CLAY (CH)**	
1						ND				Annulus seal: bentonite pellets 3/8" dia. placed from ground surface to 3' below grade. *Riser pipe*: 3/4" dia. PVC flush threaded joints with O-rings. 6" dia. soil boring		
3						ND				Filter sand (20-40) at 3' to 5' below grade (2 bags used). (3.0)		
4											- with ferrous stains at 4' - 6'	
5						ND				Top of screen at 5' to 10' below grade. Well screen: 3/4" dia. PVC with 0.010" slots. Flush threaded to riser above with O-ring and to PVC plug below. (5.0)		
6											- soft to firm layer at 6' - 8'	
7						ND						
8											- with ferrous stains at 8' - 10'	
9						ND						
10		▽								Bottom of screen, well and bore hole at 10'. (10.0)	**Hole terminated at 10 Feet.**	10.0
15												
20												
25												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data	Advancement Method	Notes
▽ First encountered at 10 ft.	Short-flight Auger: 0' - 13'	ND: No Detection
	Well Construction Notes	
	Installed monitoring well	

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PROJECT: Stormwater Pond Conversion
Motiva Convent Refinery
Convent, Louisiana

CLIENT: Motiva Enterprises, LLC
Convent, Louisiana

WELL INSTALLATION LOG
No. MW-22
SHEET 1 OF 1

FILE: 915073
DATE: April 14, 2005
DRILLER: C. Penton
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
LAT: 30° 06' 53.2"N
LONG: 90° 53' 10.1"W

Depth (feet)	Samples	Groundwater Level	Field Test Results	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	OVA Reading	Moisture Content MC	Liquid Limit LL	Plasticity Index PI	Installation Details	Description	Strata Break Depth
										6-inch protective steel shroud. *Top of riser cap at 3' above grade*. Concrete pad: 5' x 5' x 4" thick with 4 steel guard posts (-0.3)		
0–4						ND; ND				Annulus seal: bentonite pellets 3/8" dia. placed from ground surface to 5' below grade. Riser pipe: 3/4" dia. PVC flush threaded joints with O-rings. 6" dia. soil boring	Stiff to very stiff gray and brown **SILTY CLAY (CL)/CLAY (CH)**	4.0
5						ND				Filter sand (20-40) at 5' to 7' below grade (2 bags used). (5.0)	Firm to stiff gray **CLAY (CH)**	6.0
6–12		▽ (10)				ND; ND; ND				Top of screen at 7' to 12' below grade. Well screen: 3/4" dia. PVC *with 0.010" slots. Flush threaded to* riser above with O-ring and to PVC plug below. (7.0) Bottom of screen, well and bore hole at 12'. (12.0)	Soft to firm gray and orange **SILTY CLAY (CL)** - soft, with ferrous stains below 8'	12.0
											Hole terminated at 12 Feet.	

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data
▽ First encountered at 10 ft.

Advancement Method
Short-flight Auger: 0' - 13'

Well Construction Notes
Installed monitoring well

Notes
ND: No Detection

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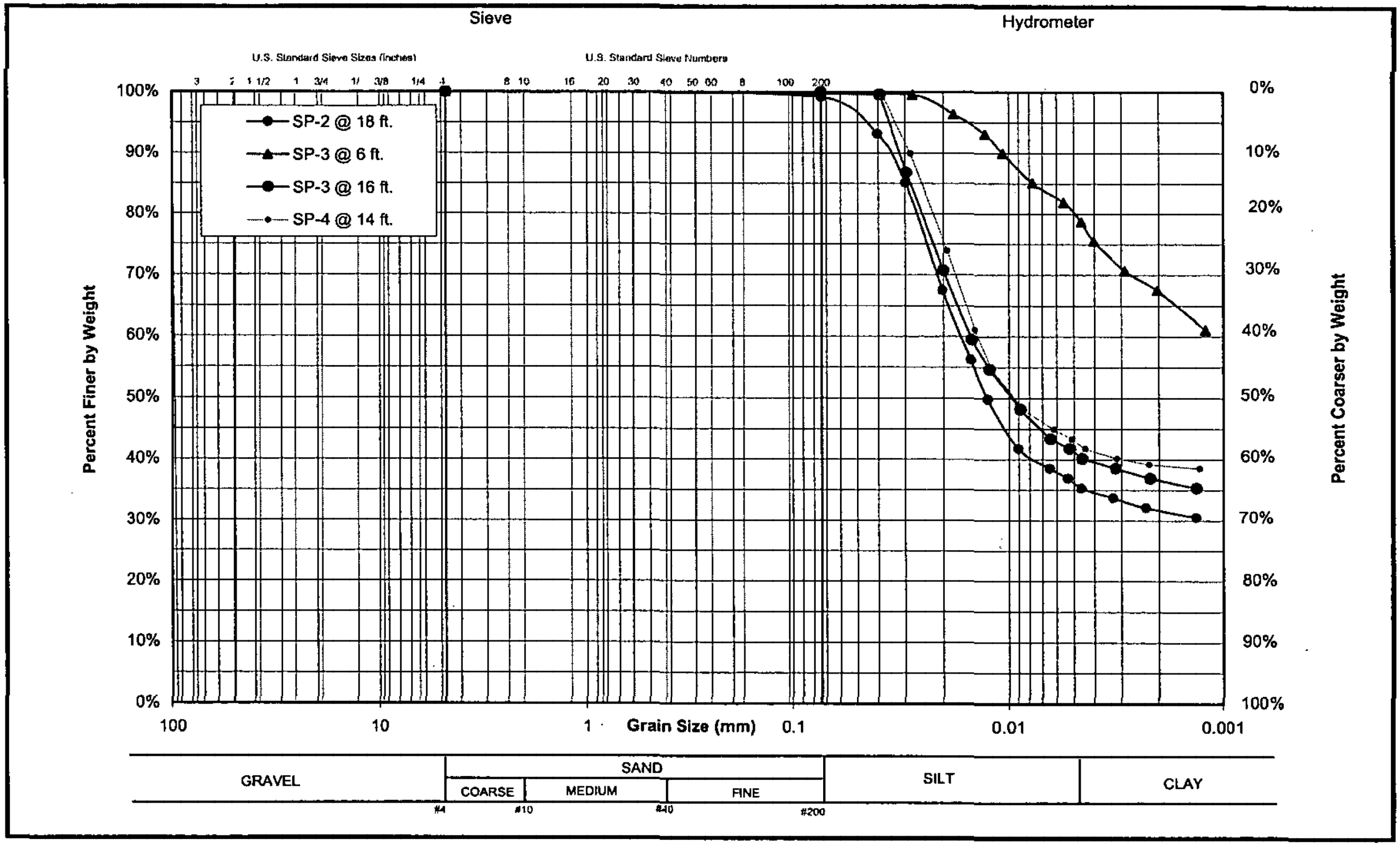
Grain Size Curves

Clean Water Pond Conversion
Motiva Enterprises, LLC



SOIL BORING LEGEND

FIELD DATA | LABORATORY DATA

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Other/ Percent Finer	Natural Moisture Content and Atterberg Limits (Plastic Limit, Moisture Content, Liquid Limit) 20 40 60 80	Plasticity Index PI	Location: Coordinate (North & East) Latitude Longitude Surface Elevation: Elev. DESCRIPTION	Soil Type
										CONCRETE	
			Auger Sample							FILL	
			Pocket penetrometer reading								
5			1.00							CLAY	
			Shelby Tube Sample							SANDY SILT	
			Standard Penetration Test (blows/foot)							CLAYEY SAND	
10			35 b/f 17-17-18								
			Split Spoon Sample							CLAYEY SILT	
										SAND	
15			No Recovery							SILTY SAND	
										SILTY CLAY	
			Rock Core Sample							CLAYEY SILT/SILTY CLAY	
20			1.00							SANDY CLAY	
			Probe Core Sample							GRAVEL	
25											

STRATA BOUNDARIES MAY NOT BE EXACT

TERMS DESCRIBING CONSISTENCY

Noncohesive Soils

(includes gravels, sands and silts) Consistency determined by Standard Penetration Resistance

Descriptive Term	Standard Penetration Resistance (blows per foot)
Very Loose	less than 4
Loose	5 to 9
Medium Dense	10 to 29
Dense	30 to 50
Very Dense	above 50

Cohesive Soils

(includes clays) Consistency determined by laboratory shear strength testing or by field visual-manual procedures.

Descriptive Term	Undrained Shear Strength (kips per sq. ft.)
Very Soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	above 4.00

FIELD TESTING

Standard Penetration Testing	Pocket Penetrometer
The penetration resistance is the number of blows required to drive the split-spoon sampler the final 12 inches of penetration.	Strength estimates of relatively undisturbed samples are obtained by penetrometer readings. The measured units are in tons per square foot (tsf).

NOTES REGARDING SOIL DESCRIPTION

Soil descriptions provide classifications according to ASTM D2487 - Classifications of Soils for Engineering Purposes. Where laboratory data are available for shear strength and for classification verification, the data are utilized. Where no laboratory data exist, the descriptions are based upon the field classifications as made during the exploration according to ASTM D2488 - Description and Identification of Soils (Visual - Manual Procedure).

Soil structure as described on the boring logs can be defined as follows:

Layer: A soil deposit with a thickness in excess of one inch
Seam: A soil layer with a thickness of less than one inch.
Homogeneous: Having the same color and appearance throughout and lacking fissures.
Fissured: Having definite planes of discontinuity within a soil mass.
Slickensided: A fissured condition with fracture planes that appear polished and glossy.
Jointed: A fissured condition with fracture planes that are numerous and limited in extent.
Laminated: Numerous thin seams of soil types which vary in texture or color.
Calcareous: Containing obvious quantities of calcium carbonate.
Indurated: Hardened by pressure or cementation.
Friable: Easily crumbled.
Organic: Containing remains of living organisms.

Groundwater Level Data	Advancement Method	Notes
▽ Water initially encountered during dry augering ▽ Groundwater level after a specified observation period ▼ Stabilized water level after an extended period of observation Actual depth to water may vary from the conditions observed in the borings. The presence of groundwater is masked in borings advanced by rotary wash methods.	Description of methodology used to advance soil boring. **Abandonment Method** Description of methodology used to abandon or fill the completed borehole.	Notes describing other laboratory tests or surface conditions.

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APPENDIX B

EXCERPTS FROM LAC TITLE 33 PART VII, SUBPART 1-
SOLID WASTE REGULATIONS

Excerpts from LAC Title 33 Part VII, Subpart 1 - Solid Waste Regulations Pertinent to Hydrogeologic and Geotechnical Considerations

§709. Standards Governing All Solid Waste Disposal Facilities (Type I and II)

C. Facility Geology

1. Soils

a. Except as provided in Subparagraph C.1.b of this Section, facilities shall have natural soils of low permeability for the area occupied by the solid waste facility, including vehicle parking and turnaround areas, that should provide a barrier to prevent any penetration of surface spills into groundwater aquifers underlying the area or to a sand or other water-bearing strata that would provide a conduit to such aquifers.

Response

The upper clay formation that is present at the ground surface is be essentially impermeable. Two permeability tests were performed on a sample from the upper clay. The results indicated a hydraulic conductivity of 6.1E-09 cm/sec and 9.7E-09 cm/sec. Such conditions are among the lowest hydraulic conductivity values that would be expected for soil formations.

b. A design for surfacing natural soils that do not meet the requirement in Subparagraph C.1.a of this Section shall be prepared and installed under the supervision of a registered engineer, licensed in the state of Louisiana, with expertise in geotechnical engineering and geohydrology. Written certification by the engineer that the surface satisfies the requirements of Subparagraph C.1.a of this Section shall be provided.

Response

The design is unnecessary because of the low permeability natural conditions present at the site

c. The subsurface soils and groundwater conditions at Type I facilities and at Type II surface impoundments and landfills shall be characterized by a registered engineer, licensed in the state of Louisiana, with expertise in geotechnical engineering and geohydrology or by a geologist with expertise in these fields. The characterization shall meet the following guidelines.

i. Geotechnical borehole spacing shall be no greater than 450 feet (minimum of four borings required).

ii. All boreholes shall extend to a depth of at least 30 feet below the lowest point of the excavation. At least 10 percent of the borings (minimum of three borings) shall extend to 100 feet below grade level to characterize the shallow geology.

iii. All borings shall be continuously sampled to at least 30 feet below the base of excavation, with the use of thin-wall and/or split-spoon devices or similar coring devices. After 30 feet, samples shall be at 5-foot intervals.

iv. Borings, geotechnical field tests, and laboratory tests shall be conducted according to the standards of the American Society for Testing and Materials (ASTM) or the Environmental Protection Agency (EPA), or other applicable standards approved by the administrative authority.

Response

The four additional borings were drilled and sampled to meet these requirements. The borehole spacing was less than 450 feet, all borings were continuously sampled to a depth of 40 feet, which is in excess of 30 feet below the lowest excavations, and one boring was extended to a depth of 100 feet.

The soil boring logs include the results of field and laboratory testing to characterize the subsurface conditions. All geotechnical field tests, and laboratory tests were conducted according to the standards of the American Society for Testing and Materials (ASTM)

2. Units of a facility located in a seismic impact zone which have not received waste prior to October 9, 1993, shall be designed and operated so that all containment structures, including liners, leachate collection systems, and surface water control systems, can withstand the stresses caused by the maximum horizontal acceleration in lithified earth material for the site.

Response

The facility is not in a seismic impact zone

3. Facilities shall not be located in an unstable area unless the permit holder or applicant can demonstrate that the facility is designed to ensure the integrity of structural components, such as liners, leak-detection systems, leachate collection, treatment and removal systems, final covers, run-on/runoff systems (or any other component used in the construction and operation of the facility that is necessary for the protection of human health or the environment). In determining whether an area is unstable, the permit holder or applicant must consider, at a minimum, the following factors:

a. on-site or local soil conditions that may result in significant differential settling;

b. on-site or local geologic or geomorphological features; and

c. on-site or local human-made features or events (both surface and subsurface).

Response

With the exception of the existing sediment accumulation within the impoundment, the facility is not located in an unstable area. The natural soil conditions are not susceptible to significant differential settling, and the local geologic features are not considered unstable, The construction plans will provide for removal of the sediments that would be considered unstable under a construction quality assurance and control plan.

§713. Standards Governing Surface Impoundments (Type I and II)

3. *Liners*

a. The standards in Paragraph B.3 of this Section apply to liners for Type I and II proposed surface impoundments and for surface impoundments constructed subsequent to the required upgrade date specified in LAC 33:VII.315.G. (Units of surface impoundments on which construction is completed prior to the upgrade date specified in LAC 33:VII.315.G and which have received a temporary permit or standard permit prior to February 1, 1993, are not governed by these liner standards.)

b. The permit holder or applicant must provide and implement a quality-control and quality-assurance plan for liner construction and maintenance that will ensure that liners are designed, constructed, installed, and maintained properly. All facilities must have quality-control plans for the excavations. All excavations and liners shall be inspected and certified by a registered engineer, licensed in the state of Louisiana, with the appropriate expertise.

Response

A quality control and quality assurance plan has been developed to address the excavations and liner systems that will be necessary for the impoundment.

c. The permit holder or applicant must demonstrate that the liner is placed upon a base that provides the following:

i. adequate support for the contents;

ii. maximum resistance to settlement of a magnitude sufficient to affect the integrity of the liner or the proper positioning of the leachate-collection or leak-detection system;

iii. maximum resistance to hydrostatic heave on the sides or bottom of the excavation; and

iv. maximum resistance to desiccation.

Response

The quality control and quality assurance plan address removal of existing sediments that have accumulated within the impoundment and verification of a stable subgrade that will provide resistance to damaging settlements, will provide resistance to hydrostatic heave and will resist desiccation.

d. Units of surface impoundments shall be lined along the sides and bottom with a composite liner consisting of a geomembrane liner at least 30-mil thick installed directly above and in uniform contact with a 3-foot recompacted clay liner having a hydraulic conductivity no greater than 1×10^{-7} cm/sec which has been installed under the supervision of a registered engineer, licensed in the state of Louisiana and with the appropriate expertise. (If the geomembrane component is high-density polyethylene, then the geomembrane component must be at least 60-mil thick. Any geomembrane liner used must be compatible with the solid waste and leachate in the unit.) An alternative liner system which will provide equivalent or greater groundwater protection at the site as compared to the composite liner, as demonstrated by generally accepted modeling techniques and based on factors specific to the site and to the solid wastes received, may be used. The burden of proof of adequacy of the alternate liner design shall be on the permit holder or applicant.

Response

Subsequent to sediment removal and subgrade characterization, the impoundment will be lined along the bottom and the sides with a minimum three foot thick recompacted clay liner. The recompacted clay liner will be overlain with a 60 mil HDPE geomembrane. These liners will be installed in accordance with the quality control and quality assurance plan.

APPENDIX C

CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
STORMWATER POND CONVERSION

aquaterra engineering

CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN

Stormwater Pond Conversion

June 2005

Prepared For:

Motiva Enterprises, LLC
Convent, Louisiana

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CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN

Stormwater Pond Conversion
Motiva Enterprises, LLC
Convent, Louisiana

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CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN

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1.0 INTRODUCTION

The existing stormwater pond at the Motiva, Convent Refinery is being converted to a solid waste impoundment consistent with regulations for solid waste impoundments as promulgated by the Louisiana Department of Environmental Quality (LDEQ). This document provides for construction quality assurance and quality control associated with the revisions necessary for this conversion.

1.1 EXISTING AND PLANNED CONSTRUCTION

The impoundment design includes the removal of existing sediments present in the existing stormwater pond and the construction of liner components to meet the requirements of the LDEQ for a solid waste impoundment. The construction includes the following general components of construction:

- Removal of existing sediments present in the base of the impoundment,
- excavation into the natural clay soils,
- construction of a three foot thick recompacted clay liner using the natural clays,
- installation of a Flexible Membrane Liner (FML).

1.2 PURPOSE

Section 33:VII.509.E.1 of the Regulations requires that:

> "Start-up inspections for new units of a standard permitted facility shall be conducted after completion of all construction measures and after submittal of certification to the Office of Environmental Assessment, Environmental Technology Division, by a registered engineer licensed in the state of Louisiana, that the unit is constructed in accordance with the permit."

Additionally, Section 33:VII.711.B.5.b of the Regulations requires that:

> "The permit holder or applicant must provide and implement a quality-control and quality-assurance plan for liner construction and maintenance that will ensure that liners are designed, constructed, installed, and maintained properly. All facilities must have quality-control plans for the excavations. All excavations and liners shall be inspected and certified by a registered engineer, licensed in the state of Louisiana, with the appropriate expertise."

The Construction Quality Assurance (CQA) report should certify that construction of the landfill facility has been performed in accordance with the project plans and specifications as well as a Construction Quality Assurance/Construction Quality Control Plan (CQA/CQC Plan). This document presents the minimum criteria by which the registered professional engineer should verify construction efforts.

1.3 SCOPE

This CQA/CQC Plan addresses the responsibility and authority of various entities involved in the construction of the landfill, quality objectives, construction testing, and documentation during construction at the facility. The plan as developed in this document addresses the following components of construction:

- Excavation;
- Sediment Removal;
- Compacted Clay Liner; and
- Flexible Membrane Liner

The CQA/CQC Plan presented in the following paragraphs contains the programs for both CQC testing and observations and CQA analyses for the construction.

2.0 RESPONSIBILITY AND AUTHORITY

The responsibility and authority of the individuals and organizations involved in the design, permitting, construction and inspection of a landfill are discussed below. These responsibilities and authorities are in accordance with the EPA Technical Guidance Document *Quality Assurance and Quality Control for Waste Containment Facilities*. The individuals, their affiliation, responsibilities and authorities are described as follows:

Permitting Agency. The Louisiana Department of Environmental Quality (LDEQ) is the agency responsible for permitting the landfill. LDEQ maintains the responsibility to review the construction specifications and the CQA/CQC Plan for compliance with the agency's regulations. LDEQ also has the responsibility to review all CQA/CQC documentation during or after construction of a facility, possibly including visits to the construction site to observe the CQC and CQA practices, to confirm that the approved CQA/CQC Plan was followed and that the facility was constructed as specified in the design.

Owner. Motiva is the owner/operator and is responsible for the design, construction, and operation of the facility. This responsibility includes complying with the requirements of the LDEQ, the submission of CQA/CQC documentation, and assuring the LDEQ that the facility was constructed as specified in the construction plans and specifications and as approved by the permitting agency. Motiva has the authority to select and dismiss organizations charged with design, construction, and CQA/CQC.

Owner's Representative. Motiva will designate an official representative who is responsible for coordinating schedules, meetings, and field activities. This responsibility includes communications to other members in the owner/operator's organization, owner's representative, permitting agency, material suppliers, general contractor, specialty subcontractors or installers, and CQA Engineer.

Design Engineer. The design engineer is selected by the Owner/Operator. He is responsible for developing a landfill that fulfills the operational requirements of the owner/operator, complies with accepted design practices for landfills, and meets or exceeds the minimum requirements of the permitting agency. The design engineer may be requested to change some aspects of the design if unexpected conditions are encountered during construction (e.g., a change in site conditions, unanticipated logistical problems during construction, or lack of availability of certain materials). Such modifications may be in writing or verbally. In either case, details of the changes must be received by the CQA Engineer and CQC Manager. The plans and specifications referred to in this plan are the product of the Design Engineer. They are a major and essential part of the permit application process and the subsequently constructed facility.

General Contractor. Motiva generally contracts with a General Contractor for construction of landfill cells or other civil improvements at the facility. The General Contractor arranges for purchase of materials that meet specifications, contracts with subcontractors for specialized needs, and has overall control over the construction operations, including scheduling. The General Contractor has the primary responsibility for ensuring that a facility is constructed in accord with the plans and specifications that have been developed by the Design Engineer and approved by LDEQ. The General Contractor is also responsible for informing Motiva and the CQA Engineer of the scheduling and occurrence of all construction activities. Motiva may serve in the capacity of General Contractor and arrange for all, or a portion, of the necessary material, fabrication, and installation contracts. In such cases, Motiva's representative will serve the same function as the General Contractor.

Subcontractor. Specialized portions of the construction may be performed by a subcontractor to the General Contractor, or by a specialty contractor hired directly by the manufacturer, or fabricator, or by Motiva directly. The duties of the subcontractor will be established by the General Contractor or Motiva. The subcontractor is responsible for informing the contractor, Motiva and the CQA Engineer of the scheduling and occurrence of all construction activities to be performed by them.

CQC Personnel. Construction quality control personnel are individuals who work for the General Contractor, installation contractor, subcontractor or CQA Engineer and whose job it is to collect the data necessary to document that construction is in accord with the plans and specifications. The CQC Manager should be an individual who is experienced in those aspects of landfill construction including clay and geosynthetic liner construction and leachate system installation. The CQC Manager should maintain overall responsibility for the collection and assimilation of CQC data, and the transfer of these data to the CQA Engineer. Prior to initiation of the project, the CQC Manager shall obtain from the Design Engineer a full set of the plans and specifications for the project. He will check the plans and specifications, including revisions, against the CQC/CQA Plan and specifications. Any discrepancies will be brought to the attention of the CQA Engineer for resolution. The CQC Manager will ensure that a current set of the plans and specifications is maintained at the site.

CQA Engineer. The CQA Engineer is responsible for confirming that the facility was constructed in accordance with the plans and specifications as developed by the Design Engineer and approved by LDEQ. The CQA Engineer has overall responsibility for manufacturing quality assurance, construction quality control and construction quality assurance. Motiva will select a CQA Engineer for various phases of construction, typically for each individual landfill cell construction. The CQA Engineer should be a registered professional engineer in the State of Louisiana. He/she should possess individual experience in those aspects of landfill construction including clay and geosynthetic liner construction and leachate system installation. The CQA Engineer is responsible for reviewing the CQA/CQC Plan as well as general plans and specifications for the project so that the CQA/CQC Plan can be implemented with minimal contradictions or unresolved discrepancies. Other responsibilities of the CQA Engineer include: education of CQC personnel on CQA/CQC requirements, scheduling and coordinating of CQA/CQC inspection activities, ensuring that the procedures established by this CQA/CQC plan are followed, ensuring that test data are maintained for later reporting, and preparation of periodic reports. In the event of nonconformance with the project specifications or CQA/CQC Plan, the CQA Engineer should notify Motiva as to the details and, if appropriate, recommend work stoppage and possibly remedial actions. The CQA Engineer is usually required to be at the construction site, or have a representative on-site, during all major construction operations to oversee construction and CQA/CQC personnel.

Testing Laboratory. Many CQA/CQC tests are performed by commercial laboratories. The testing laboratory should have its own internal QC plan to ensure that laboratory procedures conform to the appropriate American Society for Testing and Materials (ASTM) standards or other applicable testing standards. The testing laboratory is responsible for ensuring that tests are performed in accordance with applicable methods and standards, for following internal QC procedures, for maintaining sample chain-of-custody records, and for reporting data. The testing laboratory must be willing to allow the owner/operator, permitting agency, design engineer, installer, or CQA Engineer to observe the sample preparation and testing procedures, or record-keeping procedures, if they so desire.

3.0 CONSTRUCTION QUALITY CONTROL

Construction Quality Control (CQC) is the act of performing and documenting visual inspections, and field and laboratory testing of the construction materials and methods used and sampling of the components of construction. CQC technicians are responsible for performing the tests required and collecting the necessary samples to document that the materials and construction practices used are in accordance with the project designs.

The Daily Field Report (DFR) is the primary communication tool for the CQC technicians. The CQC Manager will prepare, or have prepared, one DFR for each day the technician is on site. At a minimum, the DFR will document the following:

- Contractors and subcontractors working on-site;
- Equipment available and operating on site;
- Weather conditions;
- Time CQC personnel were on-site;
- Summary of the contractor's activities throughout the day;
- Types of testing performed, location of the tests, and test results;
- Types of samples obtained, location of the sample points and plans for sample testing;
- Summaries of any meetings held on-site that were attended by CQC personnel; and,
- Notation of on-site visitors that are significant to the construction (design or CQA Engineer, regulatory representatives, etc.)

DFRs should be submitted to the CQA Engineer, the representative for MOTIVA, and the design engineer, as requested. Additionally, the CQC Manager should maintain a copy of each DFR at the site throughout the duration of the project.

The CQC process will result in the collection of extensive data and samples of completed work product. The location of every test or sampling point must be documented in a manner suitable to allow re-establishment of the sample location. Date and time of the action shall be included. Horizontal location shall be specified by the method in use for this work at the facility (e.g., grid coordinates, station and offset, etc.). Where elevation is also important (e.g., lift number), it shall be included. Each test or sample shall be assigned a unique number.

Any sample to be sent off-site shall be under chain-of-custody control. The control sheet shall include the unique sample identification, the sample destination, and the required testing.

The CQC process will oversee the major work elements of excavation, subgrade verification, compacted clay liner (or cohesive soil cover) construction and leachate collection system installation. The CQC aspects of each of these work elements are addressed individually in subsequent sections of this plan.

4.0 CONSTRUCTION QUALITY ASSURANCE

The purpose of construction quality assurance (CQA) is to ensure the facility is constructed in accordance with the project plans and that the CQA/CQC Plan is followed. Additionally, it is the responsibility of the CQA Engineer to review all CQC actions, perform analytical and statistical analyses of the data collected, and to prepare the certification report.

The CQA Engineer will maintain copies of all DFRs, field and laboratory test reports, project-related memoranda, design change information, etc. He will review all such information and document its compliance with this CQA/CQC Plan.

The CQA Engineer shall prepare various, routine interim reports to the client/owner summarizing the work to date. These reports shall be submitted to the client/owner at the frequency directed.

Upon completion of a cell, phase of a cell, portion of the final cover or other milestone occasion as directed by the owner, the CQA Engineer shall prepare a final Certification Report on the work accomplished. This report shall be signed and sealed by the CQA Engineer. The report shall include the following:

- Results and locations of all tests;
- All Daily Field Reports;
- Statistical summaries of all tests;
- Demonstration that the construction specifications were met;
- Demonstration that the testing frequencies of the CQA/CQC Plan were met;
- Demonstration that the acceptance criteria of the CQA/CQC Plan were met; and
- Certification that the components inspected met the plans and specifications.

5.0 SURVEYING

Field surveys are required for construction layout, determination of excavation depth, verifying liner thickness and final waste grades, as well as quantity take-off. The following sections summarize surveying requirements.

5.1 FIELD CONTROL

The Design Engineer will establish reference points and benchmarks which shall constitute the field control. This work will be performed under the supervision of a registered professional land surveyor. Horizontal control lines will be laid out in advance of construction operations and will be coordinated with the General Contractor.

5.2 CONSTRUCTION LAYOUT

From the field control set by the Design Engineer, the General Contractor shall establish and maintain all necessary controls for the proper layout and performance of the work. The contractor shall use competent personnel and suitable equipment for the layout work required.

5.3 VERIFICATION

The CQA Engineer will have surveys conducted to verify that phases of the work have been completed in accordance with the permitted design. These surveys shall be made utilizing a control grid with control points spaced no greater than 50 feet on center. On side slopes, each section will include at least the crest and toe. Side slopes greater than five vertical feet in height shall also include an intermediate point. These points are required even if fewer points would satisfy the 50-foot spacing requirement.

Upon completion of excavation to subgrade, a verification survey shall be made to document subgrade elevation. This survey will serve as the base elevations for the compacted clay liner.

Subsequent of completion of the compacted clay liner, a verification survey will be made to document the surface of the compacted clay liner and the thickness of the liner. Thickness measurements on slopes must take into account the slope and must provide for the required component thickness as measured perpendicular to the slope.

5.4 ACCURACY

Layout of all facilities shall be referenced to the Louisiana State Plane coordinate system. Horizontal layout shall consist of a closed loop (either on itself or to a known coordinate point) with an error of closure not greater than 1:1000. Level surveys and cross-section surveys shall begin and be tied back into established bench- marks. Turning points should be solid objects with readings taken to the nearest 0.01 ft. Error of closure of level surveys should not exceed 0.03 ft. Individual elevation shots (cross-sections and thickness) shall be taken to the nearest 0.01 ft.

5.5 VARIATIONS

The CQA Engineer may grant variances from the thickness requirements provided that:

- The point is not deficient by more than 0.1 feet, and
- No more than 5% of points are deficient, and
- These points are not concentrated in one area, and
- The average thickness (including the deficient points) meets or exceeds the specified value.

5.6 DOCUMENTATION

All survey data will be recorded in electronic data collectors or standard field books. Notes shall include date, section surveyed, weather conditions and names of the members of the survey party. Surveys shall be plotted when required, to facilitate determination of compliance with specification requirements.

6.0 QA/QC FOR ELEMENTS OF CONSTRUCTION

The quality control, quality assurance and surveying requirements provided above will apply to the various elements of construction that are required for the landfill. Because of the unique construction aspects of each element, each is addressed separately in the following sections. Tables 3 through 9 provided within this plan present testing methods, frequencies and requirements for each of the construction elements. The following sections detail these testing requirements.

6.1 SEDIMENT REMOVAL/SUBGRADE VERIFICATION

As noted in Section 1.1, the sediments present in the stormwater pond will be removed to expose the underlying clay deposits which form the subgrade.

The subgrade is defined as the soils which form the floor and side slopes of the cell after all sediments have been excavated but prior to placement of compacted clay liner. Upon the completion of excavation, the subgrade will be inspected to document conditions. The inspection will consist of a walkover by the CQC Technician, and a written record of visual observations will be made during the walkover. The visual observations shall be accompanied with photographs of typical and anomalous conditions.

In addition to the visual classifications, the subgrade will be sampled on a frequency of one sample per 20,000 square feet of subgrade area. Sampling will include the collection of samples at one foot intervals to a depth of three feet below the design top of recompacted clay layer.

The samples will be submitted to the geotechnical testing laboratory to determine index properties. At a minimum, each sample will be tested to determine Atterberg limits (ASTM D4318) and classified according to ASTM D4388. If the classification notes the presence of significant sand, testing to determine percent passing the No. 200 sieve (ASTM D1140) will also be performed.

In addition to the routine sampling as described in the above paragraph, any areas which exhibit anomalous conditions (as observed during the site walkover) will be sampled to determine the spatial and vertical extent of the anomalous subgrade soils. The samples from these areas will also be tested in the geotechnical laboratory as noted in the previous paragraph.

6.2 STRUCTURAL FILL

Earthen fill may be required to achieve the subgrade at the facility. This fill must be constructed with the proper materials and to adequate densities to meet the structural requirements necessary to support the landfill. The following paragraphs address these issues.

6.2.1 Materials Verification

Fill materials should be tested to document classification (ASTM D 2487) and moisture-density relationship (ASTM D 698). Suitability of the soils is a function of the fill use and should be accepted by the design engineer and the CQA engineer.

6.2.2 Fill Placement/Compaction/Testing

The fill materials should be placed in loose lifts graded to provide a uniform thickness not exceeding nine inches. The surface of each preceding, compacted lift should be lightly scarified to ensure adequate bonding between lifts.

The moisture content during compaction and the required compaction dry density are listed on Table 1. The frequency and methods of testing are also listed on that table.

6.3 COMPACTED CLAY LINER/COHESIVE SOIL COVER

The compacted clay liner and cohesive soil cover for closure (soil liners) will be constructed using soils obtained from on-site if the subgrade testing program indicates that the materials meet minimum acceptability guidelines.

6.3.1 Material Acceptance

The selection of the proper soil types and documentation of material consistency is a requirement for a low permeability, compacted liner or cover. Therefore, material acceptance includes an initial material evaluation program and a continued material verification during construction.

The subgrade testing program outlined in Section 6.1 will be used to determine the suitability of the in-place clays for use as materials for recompacted clay liner. The acceptability standards for materials use as clay liner are listed in Table 1.

6.3.2 Construction Control

During construction of the constructed soil liner, visual control must be exercised to observe material consistency and appropriate construction methods. The following paragraphs outline the requirements for visual control of construction quality of the soil liner systems.

6.3.2.1 Roots/Clods

The QC representative shall maintain continuous visual inspection of all soil liner material placement, processing, and compaction. He shall observe the materials to determine no substantial change in materials from the accepted materials. In addition, he should watch for the presence of roots, sticks, stones, or other deleterious matter, and for clod size.

No roots or sticks with a diameter in excess of ½ inch or length in excess of 6 inches should be allowed to remain in the loose lifts. Clods should be processed by disking or other means to render clod sizes of less than 3 inches prior to compaction. In addition, the materials should be essentially free of any other foreign materials.

The QC representative shall notify the earthwork contractor of non-conformities. In the event such non-conformities are not resolved, the compaction effort should be suspended, and the CQA Engineer should be notified. Any such notification requirements should be recorded in the DFR.

6.3.2.2 Lift Thickness

Loose lifts of soil liner should not exceed nine inches. The QC representative shall verify the uncompacted lift thickness continuously. This shall be done by making visual observations of the thickness of newly deposited soils over the prior compacted lift. Notations regarding lift thickness should be made in the DFR and in the photographic record to document the QC effort.

6.3.2.3 Compaction Techniques

The compactive effort should be accomplished by using a compactor with the ability to penetrate the lift thickness at least 4 inches with "teeth" or "pads" on the compacting device. The CQA Engineer will determine the adequacy of compaction equipment prior to construction. The number of passes over the loose lift should be no less than three, but should be adequate to achieve the required moisture density requirements. The QC technician should maintain continuous visual observations of the compaction effort, and document the compaction techniques in the DFR and in the photographic record.

When tested in accordance with Section 7.3.3, the compacted lift must exhibit a minimum dry density of at least 90% of its maximum as determined by the standard Proctor compaction test (ASTM D 698), and the moisture content must be equal to at least optimum moisture content and no greater than 8% in excess of optimum moisture content (as determined by ASTM D698).

6.3.2.4 Lift Bonding

After each lift is placed and compacted, and prior to placement of a subsequent lift, the surface of the existing lift should be sufficiently moistened and roughened to allow bonding of the two lifts. This should be accomplished by watering as necessary and scarifying the existing lift to form a one to two inch thick roughened surface. Scarification can be accomplished with a disc, compactor or similar equipment to achieve the required result.

The construction quality control should include visual documentation of the continuous scarification process. This effort should be documented in the DFRs and in the photographic record.

6.3.3 Field Moisture/Density Testing

Subsequent to placement and compaction of each lift, the QC technician should determine the in-place density and moisture content for comparison to the predetermined requirements as established in Section 6.3.1. In place testing of the completed liner to determine dry density should be performed using nuclear methods (ASTM D 2922). In place testing of the completed liner to determine moisture content should be performed using nuclear methods (ASTM D 3017). Alternatively, undisturbed samples can be collected from the compacted liner and submitted to the geotechnical laboratory for direct measurement of dry density and moisture content. Testing frequency and acceptability requirements are specified in Table 1.

All holes made into compacted liner material must be backfilled with dry bentonite pellets or granulated bentonite which shall be tamped lightly into the hole, wetted, and covered with moist liner soil and retamped.

Separate samples should be collected for laboratory moisture content analysis to verify the nuclear testing method. The number of separate samples should be sufficient to determine the need for moisture correction, as specified by the CQA Engineer. Appropriate moisture corrections should be applied to the nuclear testing methods if the moisture content analyses indicate the need.

The test results should be compared to the acceptance criteria established during the material evaluation program as documented in Table 1. Every test must be specifically marked "Pass" or "Fail" in the report of test results. Areas where failing tests are recorded shall be reworked and retested until satisfactory results are obtained. Retests shall be tracked such that a failing tests successive passing test is readily identified.

6.3.4 Permeability Testing

Verification samples will be collected and submitted to the geotechnical laboratory to measure the permeability (ASTM D 5084) of the in-place liner/cover. Samples will be collected and tested at a frequency of at least one sample per acre per lift of in-place soils as shown on Table 1.

All loose surface material shall be removed prior to sampling. The samples shall be taken using the 3-inch drive cylinder method (ASTM D2937), except that field weighing is not required. The permeability sample shall be the full size of the ring for at least two inches in length and have axis perpendicular to the face of the compacted clay for parallel lift construction. The hole(s) shall be backfilled by filling with dry bentonite pellets or granulated bentonite, tamping lightly, covering with moist liner soil and retamping.

The sample shall be trimmed so that none protrudes from the drive cylinder. It shall then be placed into a plastic bag or other container to preserve moisture, which shall be indelibly marked. It shall be returned to the laboratory under Sample Control as soon as possible.

If a sample fails, the CQC Manager shall inform the CQA Engineer and the Client/Owner's Representative. The area to be reworked shall be determined by the CQA Engineer and proposed to the Client/Owner's Representative. Such area shall be reworked, and then retested for moisture/density in accordance with previous sections and for permeability.

Upon completion of the construction, the CQA Report should include an updated Table 2 and Figure 3 (with updated regression analyses) to include the additional data for use in the subsequent cell construction.

6.3.5 Subgrade Acceptance

Upon satisfactory completion of the compacted soil liner, the surface of the liner must be prepared for deployment of the geomembrane liner or FML, where applicable. This process must be observed by the CQC Technician and documented by a Subgrade Acceptance Form. This form must be signed and dated by the Contractor and geomembrane or FML installer and must specify the area that is being accepted. This acceptance by the geomembrane or FML installer documents the suitability of the subgrade for geomembrane liner or FML deployment and seaming.

6.4 GEOMEMBRANE LINER OR FML

Upon acceptance of the subgrade of the completed soil liner, as accepted by the geomembrane liner or FML installer in the form of the subgrade acceptance document (see Paragraph 6.3.5), the FML shall be placed in direct and uniform contact with the soil liner. The following paragraphs detail CQA requirements with relation to the installation of the geomembrane liners.

6.4.1 *Material Acceptance*

The geomembrane or FML supplier shall provide the CQA Engineer with manufacturer quality control (MQC) information and warranty data for the materials to be delivered on site at least one week prior to delivery. The CQA Engineer will compare the material MQC data to the requirements as provided on Tables 2A and 3A for the smooth and textured HDPE geomembrane. Based upon the information provided, the CQC Engineer will accept the materials for shipment if the requirements of Tables 2A and 3A are met.

The CQC Technician shall inventory all geomembrane or geotextile materials that are received at the site. The inventory will document that the MQC information provided previously to the CQA Engineer is applicable to the inventory shipped.

The CQC Technician shall also observe material handling and storage. Handling of the geomembrane or FML should be with procedures that will not cut puncture or otherwise abrade the materials. Any noticeable defects of the delivered material will be documented on the material inventory sheets, and the damaged rolls shall be segregated.

6.4.2 Construction Control

The construction control of geomembrane or FML deployment and seaming includes visual observations and record keeping as well as destructive sampling and seam testing. The following sections outline procedures for each. An important variation from the CQC procedures associated with the geomembrane or FML is the utility of the geomembrane or FML installer's employees to perform CQC testing of welds (trial welds and continuous seam sampling). The CQA Engineer shall provide an on-site CQA Technician to observe deployment, seaming and CQC of the geomembrane liner or FML. Geomembrane field testing requirements are summarized on Tables 2B and 3B for smooth and textured HDPE geomembrane, respectively.

6.4.2.1 Proposed Panel Layout Plan

Prior to deployment of the geomembrane liner or FML, the installer will provide the CQA Engineer with a proposed panel layout plan. This plan will illustrate the panel lengths and width, the orientation and direction of the deployment process, and the sequence of deployment. The plan will also include a description of procedures to deploy the geomembrane liner or FML and to temporarily secure the geomembrane liner or FML prior to seaming.

The CQA Engineer will develop a panel and seam numbering system based upon the proposed panel layout. The system will provide a unique number to identify each panel and seam and will be sufficient to be utilized in the field by the CQC and CQA Technicians.

6.4.2.2 Visual Inspection

The CQA Technician shall maintain continuous, visual observation and documentation of liner deployment and seaming. Specifically, the following observations shall be made.

- Deployment techniques for the synthetic liner will be documented.
- Scratches or crimps in the geomembrane liner or FML will be documented directly on the liner.
- Damage to the underlying soil liner will be identified.
- Compliance with the proposed panel layout plan will be documented and any variations will be noted on the panel layout plan.
- Overlap of panels will be measured and documented every 50 feet prior to seaming to document that minimum overlap has been accomplished.
- Wrinkles developed within the geomembrane liner or FML, including wrinkle height, length, etc. and provisions to minimize wrinkle formation will be noted.
- Repair procedures for all scratches, punctures, tears and crimps will be documented.
- All test weld and seaming operations will be observed (see Section 7.4.3).
- All CQC Technician nondestructive seam testing will be observed and documented, noting methods used for seam testing.
- During deployment, seaming and covering, observations of personnel and/or vehicular traffic on the deployed geomembrane liner or FML and related activities that could damage the synthetic liner.

As-built drawings will be made during construction of the liner, and shall include at least the locations of all welded seams, patches, caps, destructive test locations, and panel numbers.

6.4.3 Seam Testing

Approved processes for field seaming are extrusion welding and fusion welding. Seam testing shall include trial welds, continuous (non-destructive) testing of completed seams, and destructive testing of completed seams in accordance with Tables 2B and 3B. The trial welds and continuous testing shall be performed by the Installer and documented by the CQA Technician. The destructive samples shall be secured by the CQA Technician and shipped to an independent third party laboratory, certified by the Geosynthetics Accreditation Institute (GAI for testing.

6.4.3.1 Field Test Welds

Field test welds are a performance test for the welder and his welding equipment. Prior to performing any seams, each technician and welding equipment shall perform a field test weld. Field test welds shall be made at the beginning of each seaming period and if there are significant changes in ambient conditions (temperature variation, moisture). Each seaming technician shall make at least one trial seam each day. After performing a trial seam, two adjoining one inch specimens will be cut from it and tested in shear and peel.

The seaming technician and his equipment shall not be used until satisfactory trial seams have been performed. Each test weld will be documented on a test weld form. The documentation will be performed by the CQC Technician.

6.4.3.2 Non-Destructive Testing

All non-destructive seam testing will be continuously performed and documented on all welded seams, patches and repairs. Air pressure testing shall be performed for fusion welds where an air channel exists between double welds. Acceptable results for each type of material are listed in Tables 2B,3B, and values are derived from GRI GM-6. Extrusion welds shall be tested by vacuum testing techniques. During the test, no air bubbles appearing after 10 seconds under a vacuum box are acceptable. The CQA Engineer may approve alternative testing procedures if the geomembrane liner or FML installer can prove equal or better capability to detect seam failures. The geomembrane liner or FML Installer should provide the procedures to be used in a separate CQC Plan developed by the Installer. The specific testing program will be reviewed and approved or modified by the CQA Engineer.

6.4.3.3 Destructive Testing

Destructive samples will be obtained from the welded production seams at a frequency as specified on Tables 2B and 3B. The sample should be of sufficient size to yield three 1 foot by 1 foot samples with the seam approximately centered in each sample. One sample shall be provided to the Installer for testing, one seam shall be tested by an independent third party laboratory and the remaining sample shall be archived by the CQA Technician. All samples should be labeled to identify the sample and seam number and date seamed, the welder and the welding equipment. The label should also identify the technician who tested the seam.

Five subsamples should be tested in shear and five in peel in accordance with ASTM D4437. A passing test is one that achieves the minimum acceptable requirement of Tables 2B and 3B.

The results of the testing should be compared to the requirements by the CQC Manager, and the results should be faxed to the CQA Technician who shall notify the Installer of the results. Test results should be provided to the Installer within 24 hours after shipment of the samples.

6.4.4 Documentation

Upon completion of the geomembrane or FML installation, the CQA Technician shall complete a final panel layout plan. Alternately, the final panel layout may be determined by plan survey of panel intersections, destructive test locations, patch locations and other pertinent locations. This plan shall include the final arrangement of panels, including panel and seam numbering, the type of seaming performed, the locations of all destructive seam tests, and the locations of all patches.

TABLE 1
CONSTRUCTION TESTING REQUIREMENTS - SOIL

Stormwater Pond Conversion
Convent, Louisiana

Item	Test Method	Minimum Frequency	Minimum Criteria
Structural Fill	Moisture-Density (ASTM D-698)	1/material	N/A
	Field Density - nuclear (ASTM D-2922)	12 tests/acre/lift (1)	Compaction $\geq$95% (2)
	Field Moisture - nuclear (ASTM D-3017)	12 tests/acre/lift (1)	$\omega_{opt} \leq \omega \leq \omega_{opt} + 4\%$
Compacted Clay Liner	Field Density - nuclear (ASTM D-2922-81)	12 tests/acre/lift (1)	Compaction $\geq$90% (2)
	Field Moisture - nuclear (ASTM D-3017)	12 tests/acre/lift (1)	$\omega_{opt} \leq \omega \leq \omega_{opt} + 8\%$
	Moisture - Density (ASTM D-698)	1 test/ 20,000 yd^3	NA
	Soil Classification (ASTM D 2487, D-4318, D 422)	1 test/ 10,000 yd^3	CH or CL < 25% sand
	Permeability (ASTM D-5084)	1 test/800 yd^3	$\leq 1 \times 10^{-7}$ cm/sec
	Survey	100 ft grid	min. thickness to +0.2 ft

Notes:
1. Using a 50-ft grid spacing, 1 test/ 2,500 ft^2/lift = ~14 tests/acre/lift.
2. In accordance with ASTM D698.

TABLE 2A

TESTING REQUIREMENTS - SMOOTH HDPE GEOMEMBRANE - CONFORMANCE
Stormwater Pond Conversion
Convent, Louisiana

Properties	Test Method	Manufacturer QC Test Frequency	Conformance QA Test Frequency	40 MIL Required Test Values (11)	60 MIL Required Test Values (11)
Thickness (min. avg.) • Lowest individual of 10 values	ASTM D-5199	1 per Roll	1 per 250,000 sf	37	54
Sheet Density (min. avg.)	ASTM D-792 or ASTM D-1505	1 per 50,000 sf	1 per 250,000 sf	0.940 g/cc	0.940 g/cc
Tensile Properties(1) (min. avg.) • Yield strength • Break strength • Yield elongation • Break elongation	ASTM D-6693 Type IV	1 per 50,000 sf	1 per 250,000 sf	84 lb/in 152 lb/in 12% 700%	126 lb/in 228 lb/in 12% 700%
Tear Resistance (min. avg.)	ASTM D-1004	1 per 50,000 sf	N/A	28 lbs	42 lbs
Puncture Resistance (min. avg.)	ASTM D-4833	1 per 50,000 sf	1 per 250,000 sf	72 lbs	108 lbs
Stress Crack Resistance(2)	ASTM D-5397 (App.)	(10)	N/A	300 hours	300 hours
Carbon Black Content (range) (3)	ASTM D-1603	1 per 50,000 sf	1 per 250,000 sf	2-3%	2-3%
Carbon Black Dispersion (4)	ASTM D-5596	1 per 50,000 sf	1 per 250,000 sf	Note (4)	Note (4)

Notes:
1. Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
   - Yield elongation is calculated using a gage length of 1.3 inches.
   - Break elongation is calculated using a gage length of 2.0 inches.
2. The SP-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used from the textured sheet materials
3. Other methods such as ASTM D-4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D-1603 (tube furnace) can be established.
4. Carbon black dispersion (only near spherical agglomerates) for 10 different views:
   - 9 in Categories 1 or 2; and
   - 1 in Category 3.

TABLE 2A (Continued)
TESTING REQUIREMENTS - SMOOTH HDPE GEOMEMBRANE - CONFORMANCE

Stormwater Pond Conversion
Convent, Louisiana

Properties	Test Method	Manufacturer QC Test Frequency	Conformance QA Test Frequency	40 MIL Required Test Values (11)	60 MIL Required Test Values (11)
Oxidate Induction Time (min. avg.)(5) • Std. OIT or • High Pressure OIT	 ASTM D-3895 ASTM D-5885	(10)	N/A	 100 min 400 min	 100 min 400 min
Oven Aging at 85°C(6) retained after 90 days (min. avg.) • Std. OIT or • High Pressure OIT	ASTM D-5721 ASTM D-3895 ASTM D-5885	(10)	N/A	55% 80%	55% 80%
UV Resistance(7) (min. avg.) retained after 1,600 hrs(8) • Std. OIT or • High Pressure OIT	GRI GM-11 ASTM D-3895 ASTM D-5885	(10)	N/A	(8) 50%	(8) 50%

Notes:
5. The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
6. It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
7. The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
8. Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
9. UV resistance is based on percent retained value regardless of the original HP-OIT value.
10. Manufacturer may provide certification letter.
11. Based on GRI GM-13, Rev. 6, dated 23 June 2003.

TABLE 2B
FIELD TESTING REQUIREMENTS - SMOOTH HDPE GEOMEMBRANE

Stormwater Pond Conversion
Convent, Louisiana

Properties	Test Method(3)	Sample Size	Minimum Field Test Frequency	40 MIL Acceptance Criteria	60 MIL Acceptance Criteria
Shear Test(1)(2)	ASTM D-6392 (excl. Section 6.3, "Conditioning")	42-in along seam, 12-in wide	Average 1 every 500 lineal ft for each type of welding		
Peel Test (1)(2)	ASTM D-6392 (excl. Section 6.3, "Conditioning")	42-in along seam, 12-in wide	Average 1 every 500 lineal ft for each type of welding		
Air-Pressure	GRI GM-6	N/A	All dual track seams	4 psi drop with initial pressure 24-30 psig for 5 minutes.	3 psi drop with initial pressure 27-30 psig for 5 minutes.
Vacuum	N/A	N/A	All extrusion seams	Examine weld for approximately 10 seconds through window for vacuum of minimum 3 psig.	Examine weld for approximately 10 seconds through window for vacuum of minimum 3 psig.

Notes:

1. Maximum of one-non FTB (Film Tear Bond) per five specimens tested is acceptable provided that strength requirements are met on that sample. Film Tearing Bond (FTB) definition: A failure to the ductile mode of one of the bonded sheets by tearing prior to complete separation to the bonded area. Examples of FTB and the associated locus of break codes are provided in ASTM D-6392.
2. For double fusion welded seams, both tracks shall be tested for compliance with the minimum property values listed above.
3. Destructive seams will be evaluated for strength parameters according to ASTM D-6392 (excluding Section 6.3 "Conditioning"). Destructive seams will be evaluated for elongation during cold weather seaming. The Installer is required to submit a cold weather seaming plan for approval along with recommendations in GRI GM-9.

TABLE 3A
TESTING REQUIREMENTS - TEXTURED HDPE GEOMEMBRANE

Stormwater Pond Conversion
Convent, Louisiana

Properties	Test Method	Manufacturer QC test Frequency	Conformance QA Test Frequency	40 MIL Required Test Values (12)	60 MIL Required Test Values (12)
Thickness (min. avg.) • Lowest individual for 8 our of 10 values • Lowest individual for any of the 10 values	ASTM D-5994	1 per Roll	1 per 250,000 sf	38 mil 36 mil 34 mil	57 mil 54 mil 51 mil
Sheet Density (max.)	ASTM D-792 or ASTM D-1505	1 per 50,000 sf	1 per 250,000 sf	0.940 g/cc	0.940 g/cc
Asperity Height (min. avg.)(1)(2)	GRI GM-12	1 per 50,000 sf	1 per 250,000 sf	10 mil	10 mil
Tensile Properties(3) (min. avg.) • Yield Strength • Break strength • Yield Elongation • Break elongation	ASTM D-6693 Type IV	1 per 50,000 sf	1 per 250,000 sf	84 lb/in. 60 lb/in. 12% 100%	126 lb/in. 90 lb/in. 12% 100%
Tear Resistance (min. avg.)	ASTM D-1004 Die C	1 per 50,000 sf	N/A	28 lbs	42 lbs
Puncture Resistance (min. avg.)	ASTM D-4833	1 per 50,000 sf	1 per 250,000 sf	60 lbs	120 lbs
Carbon Black Content(4) (range)	ASTM D-1603	1 per 50,000 sf	1 per 250,000 sf	2-3%	2-3%
Carbon Black Dispersion(5)	ASTM D-2663 ASTM D-5596	1 per 50,000 sf	1 per 250,000 sf	Note (5)	Note (5)
Oxidative Induction time (min. avg.)(6) • Std. OIT or • High Pressure OIT	ASTM D-3895 ASTM D-5885	(11)	N/A	100 min 400 min.	100 min 400 min.

Notes:
1. Of 10 readings; 8 out of 10 must be ≥ 7 mils, and lowest individual reading must be ≥ 5 mils.
2. Alternate the measurement side for double sided textured sheet.
3. Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
   - Break elongation is calculated using a gage length of 2.0 inches at 2.0 in./min.
4. Other methods such as ASTM D-4218 (muffle furnace) or microwave method are acceptable if an appropriate correlation to ASTM D-1603 (tube furnace) can be established.
5. Carbon black dispersion (only near spherical agglomerates) for 10 different views:
   - 9 in Categories 1 or 2, and
   - 1 in Category 3.
6. The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

TABLE 3A (Continued)
TESTING REQUIREMENTS - TEXTURED HDPE GEOMEMBRANE

Stormwater Pond Conversion
Convent, Louisiana

Properties	Test Method	Manufacturer QC test Frequency	Conformance QA Test Frequency	40 MIL Required Test Values [12]	60 MIL Required Test Values [12]
Oven Aging at 85°C (min. avg.) retained after 90 days[7] • Std. OIT or • High Pressure OIT	ASTM D-5721 ASTM D-3895 ASTM D-5885	(11)	N/A	55% 80%	55% 80%
UV Resistance[8] (min. avg.) retained after 1,600 hrs[10] • Std. OIT or • High Pressure OIT	ASTM D-3895 ASTM D-5885	(11)	N/A	(9) 50%	(9) 50%

Notes:

7. It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
8. The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
9. Not recommended since the high temperature of the Std-OIT test produces and unrealistic result for some of the antioxidants in the UV exposed samples.
10. UV resistance is based on percent retained value regardless of the original HP-OIT value.
11. Manufacturer may provide certification letter.
12. Based on GRI GM-13, Rev. 3, dated 23 June 2003.

TABLE 3B
FIELD TESTING REQUIREMENTS - TEXTURED HDPE GEOMEMBRANE

Stormwater Pond Conversion
Convent, Louisiana

Properties	Test Method[3]	Sample Size	Minimum Field Test Frequency	40 MIL Acceptance Criteria	60 MIL Acceptance Criteria
Shear Test[1][2]	ASTM D-6392 (excl. Section 6.3, "Conditioning")	42-in along seam, 12-in wide	Average 1 every 1,000 lineal ft for each type of welding		
Peel Test [1][2]	ASTM D-6392 (excl. Section 6.3, "Conditioning")	42-in along seam, 12-in wide	Average 1 every 1,000 lineal ft for each type of welding		
Air-Pressure	GRI GM-6	N/A	All dual track seams	4 psi drop with initial pressure 24-30 psig for 5 minutes.	3 psi drop with initial pressure 27-30 psig for 5 minutes.
Vacuum	N/A	N/A	All extrusion seams	Examine weld for approximately 10 seconds through window for vacuum of minimum 3 psig.	Examine weld for approximately 10 seconds through window for vacuum of minimum 3 psig.

Notes:

1. Maximum of one-non FTB (Film Tear Bond) per five specimens tested is acceptable provided that strength requirements are met on that sample. Film Tearing Bond (FTB) definition: A failure to the ductile mode of one of the bonded sheets by tearing prior to complete separation to the bonded area. Examples of FTB and the associated locus of break codes are provided in ASTM D-6392.
2. For double fusion welded seams, both tracks shall be tested for compliance with the minimum property values listed above.
3. Destructive seams will be evaluated for strength parameters according to ASTM D-6392 (excluding Section 6.3 "Conditioning"). Destructive seams will be evaluated for elongation during cold weather seaming. The Installer is required to submit a cold weather seaming plan for approval along with recommendations in GRI GM-9.